THE IRON TRADE REVIEW

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HOLIDAY ACTIVITY.

FURNACES AND MILLS FAIL TO SLACKEN OPERATIONS.

Heavy Sales of Pig Iron in East.—Finished Materials Much in Demand.—Structurals Improve.—Pipes Advance.

The closing of the year, which has been one of wonderful prosperity, is marked by great activity at all furnaces and mills. The slackening of operations usually characteristic of the holiday season is not noticeable this year, except when insisted upon by employes or when made absolutely necessary for repairing purposes. A few mills are closed, but the rule is to operate to the full extent.

Worried Over Ore Supply. Not a few eastern and Virginia furnaces, which were slow in making their contracts for ore, are becoming alarmed for fear that they will not be able to operate continuously during the coming year, which promises to be an exceedingly busy one. As the amount of ore required to make a ton of pig iron has gradually increased, owing to the necessity of using low grade ores, the freight rate to distant furnaces has become an increasingly important factor, and has tended to add to conservatism in making contracts for ore. All of the leading shippers of ore have contracted for vessel tonnage for 1907, which promises to eclipse the great record made on the lakes during the present year.

Iron Selling Far Ahead. Although sales of pig iron have been confined to the east during the past week to a large extent, there is much more inquiry in all parts of the country for iron for future delivery, and indications are that there will be a heavy buying movement early in the new year. Eastern furnaces have sold heavily within a few days, and some now announce that they are sold up to their full capacity through the third quarter of 1907. There have been further large sales of basic in the eastern territory for the last half of 1907, bringing the total of the past two weeks up to fully 100,000 tons. Southern pig iron is still advancing in price, and premiums could easily be obtained for prompt delivery, but railroad conditions continue very unfavorable.

Structurals in Demand. The recent efforts of representatives of structural mills to add to their bookings are shown in considerable increase in business, and specifications on contracts are heavy. Plate mills are so crowded that few of them can accept orders for delivery short of three months. The principal producer of sheets and tin plate is far behind on its deliveries. Advances in quotations on these products are likely to come at any time. The remarkable demand for wire products, frequently noted of late, continues. The demand for both iron and steel bars is strong, and some mills are sold many months into the future. An advance on both merchant pipe and boiler tubes is announced.

Scrap Market More Quiet. The old material market is firm in most centers, but lower prices are prevailing at Chicago, where dealers have been forced to unload, and sales are now being made rapidly. The demand for coke is largely for spot delivery. At Pittsburg the demand for foundry coke has not been so strong, as some consumers have requested suspension of shipments.

Large deposits of anthracite coal have been discovered in the Russian territory of the Orenburg Cossacks in proximity to the Ural iron and steel industry, which at present is chiefly dependent upon wood and charcoal for fuel. Nearby there is also a large field of brown hematite ore well adapted for smelting purposes.

COAL PROPERTIES

OF J. W. ELLSWORTH & CO. ACQUIRED BY LACKAWANNA STEEL.

Will Not be Used in Quantities for Some Time.—Details not yet Arranged.

(Special Telegram.)

New York, Dec. 26.—The Lackawanna Steel Co. has acquired the J. W. Ellsworth coal properties in Washington county, Pa. The purchase was made to provide the steel company with an adequate supply of coking and gas coal. The details have not been arranged as yet, and it will be some time before the Ellsworth coal will be used in any quantity.

LATE RAIL AND STRUCTURAL ORDERS.

(Special Telegram.)

New York, Dec. 24.—Late rail sales include 4,000 tons to the Iowa Central and from 20,000 to 25,000 tons another western road.

Structural steel orders include 2,300 tons of bridge material for the Northwestern system and 3,000 tons for the Atlantic and Roanoke, both going to the American Bridge Co. Four San Francisco jobs will require 1,300 tons, and a number of smaller orders have been filled. Bids are being received on 2,000 tons of materials for an addition to the World building and an inquiry is current on 3,000 tons for the Louisville & Nashville. About 4,500 tons have been purchased for use in Montana.

FURNACES BLOWN IN.

Harrisburg, Pa., Dec. 24.—Blast furnace activity appears to be the big feature of the Eastern Pennsylvania situation at present. In a number of instances stock accounting, which is customary at this time of the year, will be pushed over until a less busy season. Among the furnaces which have gone in within the last week or so, are Warwick No. 3, the former Anvil furnace at Pottstown; Thomas No. 3 at Hokendauqua and No. 2 of the Allentown rolling mills. One of the Crane furnaces at Catasauqua will start soon.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Large Consumers Inquiring for Pig Iron for Last Half.—Spot Tonnage Small.

Office of THE IRON TRADE REVIEW. }
521 PARK BUILDING, Dec. 24. }

The arrival of the holiday season has had little or no effect upon market conditions in this district, the fact of the matter being that it would take much more than a couple of holidays coming together to cause any important change. Practically everything that can be sold has been sold for months ahead. The great stress by the buyers is to secure deliveries and by the mills to keep from getting further behind in their shipments than they are at the present time.

Some of the mills are taking advantage of the holidays to make necessary repairs, this being imperative after the long run under heavy pressure and there will not be another opportunity as favorable for this work as the present time for months to come. In some quarters the usual tendency to defer shipments just prior to the inventory at the first of the year has been disregarded and consumers have asked producers to rush material and complete specifications as fast as possible in order that they may know at the beginning of the new year exactly where they stand.

Pig Iron.—The tonnage of pig iron for spot delivery at the furnaces, aside from that already sold on contract, is so small that it is hardly worth considering and there is so wide a range in prices that it is next to impossible to quote a market. Different furnaces having small quantities of iron for prompt shipment on new contracts vary in price from $1 to $2 per ton. A nominal quotation on prompt No. 2 foundry is $25 and Bessemer iron is nominally quoted $24 for prompt shipment. First quarter iron is now considered practically prompt, there being but a week between now and the first of the year. Second quarter northern No. 2 foundry is quoted $23 to $23.50, valley furnaces, and some producers are holding for $24. There is some inquiry for third quarter and last half foundry iron. These inquiries come from large consumers and are taken as an indication that they are ready to close for the remainder of next year. Second quarter Bessemer is quoted $22 valley furnace and for third quarter $21.50. The new No. 3 furnace of the Republic Iron & Steel Co., at Hazelton, O., was blown in this week. On second quarter delivery we quote as follows:

Bessemer Valley	22.00 to 23.00
Bessemer, Pittsburg	22.85 to 23.85
No. 1 Foundry, Pittsburg	24.35 to 24.60
No. 2 Foundry, Pittsburg	23.85 to 24.35
Gray Forge, Pittsburg	22.85 to 23.35
Basic, Valley	22.00 to 22.55
Basic, Pittsburg	22.85 to 23.30

Ferro-Manganese. — There have been a few carloads of ferro-manganese sold during the week, but the inquiry at the present is light and we quote $82.50 delivered Pittsburg for prompt shipment and $80 for forward delivery. Imported 50 per cent ferro-silicon is quoted nominally $108 to $110 and 12 per cent $36.

Muck Bar.—With $36.50 to $37 as a nominal quotation for all pig metal muck bar, with none offered at this price, and consumers with contracts urging for deliveries, there is no market and none but a nominal quotation can be made.

Skelp.—The leading producers of skelp sheets are practically out of the market and specifications against contracts are pouring in upon them at a terrific rate, there being no market to seek with new business. The plate mills are overloaded and deliveries are bad. We quote unchanged as follows:

Bessemer grooved, 1.70c to 1.75c; sheared, 1.70c to 1.75c; basic, grooved, 1.80c to 1.85c; sheared, 1.75c to 1.80c; iron skelp, 2.15c to 2.25c.

Steel.—Semi-finished steel is a scarce commodity in the Pittsburg district and soft Bessemer billets are quoted nominally $30.50 to $31, maker's mill, and open-hearth billets, $33. In spite of the fact that some of the independent consumers are getting their own steel plants into operation and by so doing withdrawing from the general market, and in some instances becoming sellers to a slight degree where they have a surplus, there has been no relief and will be none for some time to come. This is on account of the heavy demand for the material by the finishing mills of the regular sellers. While sheet bars on contract are quoted $30, this price could not be secured by buyers, and sheet bars have sold as high as $33.

Plates.—The overloaded condition of the mills at this time is such that new business cannot be accepted for delivery short of three months, although eastern mills, quoting $2 above Pittsburg mills, are in better shape and can give fairly good delivery, all things considered. The market is strong at 1.70c base, Pittsburg, with eastern mills quoting $2 advance. We quote:

Tank plate ¼-inch thick, 6¼ to 100 inches, 1.70c f. o. b. mill, Pittsburg. Light plate schedule, No. 10, 1.80c; Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c. Extras on the regular plate schedule are as follows per 100 pounds: boiler and flange steel plates 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than four inches in width at ends, narrowest end not being less than 30 inches, 0.10c; complete circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gauges under ¼-inch to and including 3-16-inch plates on thin edges, 0.10c; under 3-16 inch to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—Jobbers are specifying very heavily for their full period of 60 days and business from consumers is coming in at least two months earlier than is usual. Manufacturers are accepting it on account of the urgency of the pressure being brought to bear by those who wish to cover for their requirements, either anticipated or real, and at no time in the history of the business has there been the demand at this period of the year that there is at the present time. There has been some complaint on the score of steel shortage and the cold weather has brought on the usual difficulties with the gas and fuel supply but all things considered, mills are doing very well, despite the fact they cannot promise shipments on new business much short of twelve weeks. We quote:

Black steel sheets, one pass, cold rolled: Nos. 11-12, 2.20c; Nos. 13-14, 2.25c; Nos. 15-16, 2.30c; Nos. 17-21, 2.35c; Nos. 22-24, 2.40c; Nos. 25-26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 29, 2.75c; No. 30, 2.85c; galvanized, Nos. 10-11, 2.55c; Nos. 12-14, 2.65c; Nos. 15-16, 2.75c; Nos. 17-21, 2.90c; Nos. 22-24, 3.05c; Nos. 25-26, 3.25c; No. 27, 3.45c; No. 28, 3.65c; No. 29, 3.90c; No. 30, 4.15c. Corrugated roofing, $1.85 per square for No. 28

painted, 2½ inch corrugation and $3.15 per square No. 26 galvanized, 2½ inch corrugation. Blue annealed sheets, No. 10 and heavier 1.80c; Nos. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c.

Tin Plate.—Since the announcement last week of the second quarter price, considerable new tonnage has been placed for that delivery, although some had been taken as much as a month or six weeks ago from urgent customers. Present indications do not point to an advance in prices for some little time, at least not until after mills are pretty well filled up for second quarter shipment. We continue to quote:

Coke tin plate, 100-pounds basis, 14 x 20, $3.90 f. o. b. mill, Pittsburg district. Terms, 30 days, less two per cent for cash in 10 days.

Merchant Bars.—Mills are heavily oversold on steel bars for from three to four months, and in some cases, even longer, ahead, but business is still being taken out and the surprising feature is that this new business is not by fits and starts but comparatively steady in volume. The minimum market is 1.60c Pittsburg, one mill taking considerable business for nearby delivery at 1.80c, and making a specialty of premium business. Bar iron is moving freely, several small lots going during the week at 1.85c, Pittsburg. We quote:

Common iron bars, 1.80c Youngstown in carload lots and over, 1.85c in less than carloads; Bessemer steel bars, 1.60c, plow and cultivator, 1.60c, net; channels, angles, zees, tees, under three inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel; less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size 0.30c advance. Cold rolled and ground shafting, 50 per cent off in carload lots, and 5 per cent off in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c, sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. The price of planished and machine straightened tire is 1.80c, base, half tire extras. Iron finished tire up to 1½ inch by ½ inch, 1.75c base, half extra, tire list. Iron tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.60c base, half extras, steel card.

Hoops and Bands.—New business is light, but specifications against old contracts are very heavy and as noted last week, the mills are running about even, neither losing ground or catching up on deliveries. We quote:

Hoops, in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Structural Material. — Construction companies are beginning to work themselves out of the immense amount of business taken in during last summer and fall and are now seeking new business, the result being greatly increased new bookings by the structural mills and actual specifications given the mills are heavy. Several good tonnages have been placed during the past week. The Riter-Conley Co. will put in the structural work for the new Jones & Laughlin Steel Co., and also the new sheet mill for the LaBelle Iron Works at Steubenville, O. There is a large amount of small work being done and figured on and from a mill standpoint the structural business is in better shape now than it has been for some time past. Prices have not changed, and we quote as follows:

Beams and channels, 15 in., and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from three to six inches, inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Wire and Wire Nails.—The unprecedented demand for wire products continues unabated and contracts call for deliveries as far ahead as mills will accept them. The market is strong and prices are unchanged as follows:

Wire nails, jobbers' carload lots, $2; retailers' carload lots, $2.05; less than carloads $2.10; painted barb wire, $2.15, for jobbers in carolads; retailers in carloads $2.20; and less than carloads, $2.30, with 30c for galvanizing; plain wire, $1.85 for jobbers and $1.90 by carload.

Rails and Track Material.—Sales of standard sections for the week have been light, although there has been a fair inquiry. Light rails are in strong demand and the week closed with about 2,000 tons of additional business on the books. Another advance of $1 per ton on light rails is expected after Jan. 1. We quote:

Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carloads, $32; 8-pound, $39; 12-pound, $35; 16-pound, $33 to $34; 20 to 45-pound, $32 to $33; angle splice bars for standard sections, $1.65; spikes, $2.50 to $2.75 for forward deliveries.

Merchant Pipe.—An advance of one point or $2.00 a ton, effective Dec. 21, is announced, thus practically restoring prices of April, 1905. Business in small lots continues good where it can be taken on, although deliveries are three to four months at the best. Prices are very firm and we quote the following official discounts, consumers' carloads, jobbers' discounts being 76 basing, base sizes, and 5:

	Steel black	Steel galv.
⅛ to ¼ inch	67	51
⅜ inch	69	55
½ inch	71	59
¾ to 6 inches	75	65
7 to 12 inches	70	55
EXTRA STRONG PLAIN ENDS.		
⅛ to ⅜ inch	60	48
½ to 4 inches	67	56
4½ to 8 inches	63	51
Double extra strong plain ends, ⅛ to 8 inches	56	45

Boiler Tubes.—An advance of two points or $4.00 a ton, effective Dec. 20, is announced, thus pratcically restoring prices of April, 1905. The demand for both merchant and locomotive oilebr tubes is still heavy and prices are firm. We quote:

Boiler tubes.	Steel	Iron
1 to 1½ inches	46	43
1¾ to 2¼ inches	60	43
2½ inches	62	48
2¾ to 5 inches	68	55
6 to 13 inches	60	43

Less than carloads two points less.
2½ inches and smaller, over 18 feet, 10 per cent, net, extra.
2¾ inches and larger, over 22 feet, 10 per cent, net extra.

Coke.—Foundry coke during the past week has not been in as strong demand as it was a week ago, some consumers having suspended shipment, either on account of inventory period or because they had previously stocked up in anticipation of a slower movement due to cold weather and snow. Furnace coke is in very strong demand and foundry coke in some cases is being shipped on furnace contracts. Standard Connellville foundry coke is quoted $4 to $4.25 for shipment prior to July 1 and $3.85 to $4 on yearly contracts. Furnace coke is quoted $3.65 to $3.85 for spot shipment and $3.10 to $3.35 for the year. There is a decided scarcity of high grade furnace coke.

Old Material.—No change in conditions is noted since last week, the little trading being between dealers and we quote as follows:

Heavy melting scrap, $19.50 to $20; rerolling rails, $21.50 to $22; bundled sheet scrap, $16.25 to $16.75; iron axles, $31.50 to $32; old iron rail, $25.50 to $26.50; No. 1 wrought scrap, $21 to $21.50; old car wheels, $23 to $23.50; low phosphorus scrap, $23.50 to $24; machine shop turnings, $15 to $15.50; axle turnings, $16.75 to $17.25; cast borings, $12.25 to $12.50; No. 1 cast scrap, $19.50 to $20.

The Pennsylvania railroad is receiving bids and will shortly let the contract for 5,000 box cars.

CHICAGO.

Scarcity of Cars Becomes More Acute. —Advances in Pipe and Tubes.

Office of THE IRON TRADE REVIEW, 1362 MONADNOCK BLOCK, Dec. 24.

The scarcity of cars is acutely felt in the west, shipments from eastern mills and ovens are growing less daily, and a serious coke famine stares western consumers in the face. Thus far, the stocks on hand have been sufficient to prevent any slackening of operations, but these are rapidly diminishing and partial suspension must follow unless energetic efforts are made to overcome the shortage Increased activity is noted in all materials, despite the holiday season. Effective December 20, an advance of one point in merchant pipe, and of two points in boiler tubes, was made. The latter increase is thefirst in boiler tubes this year, and is equivalent to a raise of $4 a ton. Bar iron has strengthened, the minimum local price being 1.81½ or 1.85 Chicago. Some producers are asking $1 a ton higher for prompt shipments. From 1.90c to 2c Pittsburg is also asked for early deliveries of plates, and nothing less than 1.85c will be considered by western independent manufacturers for quick deliveries of steel bars Specifications for all forms of finished material are heavy and insistent, but owing to the car shortage deliveries are slow. The only weakness in the local market is in scrap, which has declined from 50 cents to $1.50 a ton in the week under review. The Chicago and Northwestern railway has placed with the American Bridge Co., a contract for 1800 tons of bridge material, and has received an aggregate of 1,500 tons from other sources. The American Bridge Co. has also secured a contract for 3,700 tons of riveted pipe which will be laid in the states of Utah and Montana, for the Telluride Power Co.

Pig Iron.—With the approach of the new year, there has been a revision of pig iron schedules. January shipments now come under the classification of "spot delivery" and $23 Birmingham is the minimum quotation for that shipment on southern No. 2 for delivery in February and March, $22 to $22.50 Birmingham is asked. Second quarter deliveries have advanced 50 cents a ton, and are now held at $20 Birmingham. For the third quarter $18.50 is the best price in the local market, while for the last half quotations range from $18.00 to $18.50. Virginia furnaces, which will not sell for any period less than six months, have three schedules in force. For the first half, $23 furnace is quoted for No. 2 foundry; $22 for the second half, and $21 on deliveries extending over the entire year. Northern furnaces are asking $22.50 to $23 Chicago for either No. 2 foundry or malleable Bessemer for shipment in the second half, and $26 to $26.50 for any shipment in the first half. Lake Superior charcoal is held at $25.50 Chicago for the last half and from $26.50 to $27.50 for the first half.

The freight rate between Virginia furnaces and Chicago advances 25 cents a ton, or to $3.10, Jan. 1. On the first of the following month, an advance of 45 cents a ton will be made in the freight rate between Birmingham and Chicago, or 25 cents from Birmingham to the river, and 20 cents from the river to Chicago. This increase will bring the rate up to $4.35, the highest it has been in many years. The maximum prices in the following table of quotation are for first quarter shipments, the minimum prices for second quarter. The proposed freight rate advances are not included in them and will not be added until the same become effective.

Lake Superior charcoal	$26.00 to 27.00
Northern Foundry No. 1	26.00 to 27.00
Northern Foundry No. 2	25.50 to 26.50
Northern Foundry No. 3	25.00 to 26.00
Northern Scotch Foundry	26.00 to 27.00
Ohio Strong Softeners No. 1	26.30
Ohio Strong Softeners No. 2	25.80
Southern Foundry No. 1	24.40 to 26.90
Southern Foundry No. 2	23.90 to 26.40
Southern Foundry No. 3	23.40 to 25.90
Southern Foundry No. 4	22.90 to 25.40
Southern No. 1 Soft	24.40 to 26.90
Southern No. 2 Soft	23.90 to 26.40
Southern Gray Forge	22.40 to 24.90
Southern Mottled	21.90 to 24.40
Southern Silveries (4 per cent to 6 per cent Silicon	27.40 to 29.90
Jackson Co. Silveries, 8 to 10 per cent Silicon	31.40 to 33.40
Malleable Bessemer	25.50 to 26.00

Billets.—The inability to procure any kind of semi-finished material for reasonably early delivery from Chicago mills is working a serious hardship to local fabricators. Eastern producers have the market entirely to themselves, as the Illinois Steel Co. is not taking on new contracts and the Inland Steel Co. is filled up for the first two or three months. Prices are very stiff, and forging billets at $36 Chicago and wire rods, $39 Chicago, represent minimum quotations here.

Iron and Steel Bars.—Bar iron closes the year stronger than at any other time in the twelve months just ending. Local quotations are firm at 1.81½c to 1.85c, Chicago. Business is brisk and specifications are coming in at a satisfactory rate. The car shortage is seriously delaying deliveries of steel bars. Despite the urgent appeals for shipment, little relief can be afforded, and tonnage is accumulating in mill yards. Premiums are offered for immediate delivery, and several sales have been made on the basis of 1.85c, Chicago. We quote official prices, as follows:

Soft steel bars and bands, 1.76½c, half extras; soft steel angles, less than 3 x 3, 86½c; hoops, 2.16½c base, full extras; old rail stock, 1.70c. We quote bar iron from stock, 2.20c; full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $2.00 half extras; soft steel hoops, 2.40c to 2.50c full extras. Other sizes not mentioned above, $2 per 100 pounds base plus half extras.

Sheets.—The frequent rumors of an advance in black and galvanized sheets is bringing out a large volume of new business and an increasing supply of specifications. The sheet trade has never been more satisfactory than at the present time, and mills enter the new year with enough tonnage on their books and specifications in hand to operate their plants at maximum capacity for several months. Prices are very firm, premiums being paid for early deliveries. Jobbers report considerable difficulty in replenishing their stocks owing to the crowded condition of mills and the acute car scarcity that prevails. We quote, carload lots, Chicago delivery, as follows:

Black sheets, Nos. 8, 9 and 10, 1.85c Pittsburg; No. 28 gauge, 2.60c Pittsburg. Galvanized sheets No. 28 gauge 3.65c Pittsburg. Freight to Chicago 16½c per 100 pounds. Job-

AVERAGE PRICES OF IRON AND STEEL AT CHICAGO DURING 1906.

	Jan.	Feb.	Mch.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Northern No. 2 Foundry	19.25	19.00	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
Southern No. 2 Foundry	17.95	17.65	17.65	17.75	17.60	17.70	17.15	18.35	19.40	21.40	25.90	26.90
Malleable Bessemer	19.50	19.50	19.30	19.00	18.30	18.15	18.30	18.90	20.00	21.00	26.50	27.00
Lake Superior Charcoal	20.25	20.00	20.90	19.75	19.00	19.00	19.00	19.35	20.00	20.75	26.50	27.00
Forging Billets	35.00	35.00	35.00	35.00	35.00	36.00	35.00	36.00	36.00	36.00	36.00	36.00
Bar Iron	36.50	35.30	34.30	33.30	33.30	33.30	33.30	35.30	33.30	34.30	35.30	35.30
Steel Bars	33.30	33.30	33.30	33.30	.....	.....	.....	33.30	.....	33.30	.....	.....
Small Steel Angles, less than 3 x 3 inches	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	37.30	37.30
Black Sheets, No. 28	50.30	51.30	51.30	50.30	51.30	53.30	53.30	53.30	53.30	53.30	55.30	55.30
Structural Steel	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30	37.30
Plates	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	37.30	37.30
Smooth Finished Machinery Steel	38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30	38.30	40.30	40.30
Wire Nails	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	41.00	43.00
Car Wheels	19.00	20.00	18.75	18.50	18.00	18.00	18.00	18.85	19.00	19.25	22.80	24.50
Old Iron Rails	23.00	22.50	21.00	21.00	21.00	20.75	20.50	21.40	24.10	25.50	28.00	28.50

bers' prices on less than carload lots from store are as follows: Black sheets, No. 10, 2.20c to 2.30c; No. 12, 2.25c to 2.35c; No. 14, 2.30c to 2.40c; No. 16, 2.40c to 2.50c; Nos. 18-20, 2.70c to 2.80c; Nos. 22-24, 2.75c to 2.85c; No. 26, 2.80c to 2.90c; No. 27 2.85c to 2.95c; No. 28, 2.95c to 3.05c; No. 30, 3.35c. Galvanized sheets, Nos. 10 to 20, 3.25c to 3.35c; Nos. 22 and 24, 3.40c to 3.45c; No. 26, 3.60c to 3.70c; No. 27, 3.80c to 3.90c; No. 28, 4c to 4.10c; No. 30, 5.20c to 5.30c.

Plates.—Not since 1902, have plates enjoyed the strength they have today. The leading interest has its capacity engaged for practically the whole of 1907. Specifications are voluminous, and because of the car shortage and the scarcity of crude steel, deliveries are far below the requirements of the trade. Prices are advancing, and for quick shipment premiums of $8 to $10 a ton are asked. Some producers have raised their prices to the basis of 1.90c and 2c Pittsburg, and are asking same for any delivery in the coming year. We quote as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.60c to 1.90c, Pittsburg base. For extras see Pittsburg report. Freight rate to Chicago is 16½c per hundred pounds.

Jobbers' prices for shipment from local stocks are as follows: Tank steel ¼ inch and heavier, up to 72 inches wide, 2.10c; 72 inches up to 96 inches wide, 2.20c; 3-10 inch up and including 60 inches wide, 2.20c; 3-16 inch, 72 inches wide, 2.45c; No. 8, up to 60 inches wide, 2.25c; flange steel, 25c extra; heads, 25c extra.

Structural Steel.—While new tonnage for structural shapes continues light, the volume of specifications against existing contracts shows a steady increase. Mills are greatly hampered in making deliveries by their inability to secure cars, resulting in an accumulation of material which seriously interferes with their operations. The demand for shapes by car builders and ship building interests is especially heavy, all the plants in the west engaged in these industries operating at their maximum capacity. Prices are without change as follows:

Beams and channels, 3 to 15 inches inclusive, 1.70c Pittsburg. For extras see Pittsburg report. Freight rate from that city to Chicago is 16½c per 100 pounds. Quotations from store are as follows:

All angles, three inches and larger, including six inches, $2.05 to $2.10 per 100 pounds; angles over six inches, $2.15 per 100 pounds base; beams, three inches to 15 inches, inclusive $2.05 to $2.10 per 100 pounds base; channels, three inches and larger, $2.05 per 100 pounds base. Less than carload lots are $2 a ton higher than foregoing price.

Rails and Track Supplies.—An Illinois traction enterprise has placed a contract with the Carnegie Steel Co. for 4,000 tons of standard sections. Several other inquiries from interurban roads are pending, and with the passing of the holidays most of these are expected to be closed up. The demand for track supplies and light rails is without diminution, though a large tonnage is diverted to other markets because of the inability of local mills to give the required deliveries. Prices are very firm as follows:

Bessemer rails, $28; open-hearth $29; light rails, Bessemer, 30 to 45-pound sections, $33; 25-pound, $34; 20-pound, $35; 16-pound, $36; 12-pound, $37, and lighter sections down to 8-pound, $43.50, f. o. b. mill. Track supplies vary in price according to quantity and delivery. Angle bars in large lots are quoted 1.65c to 1.75c; for smaller quantities, 2.25c to 2.75c; spikes, large lots, 2.25c; for smaller quantities, 2.50c; bolts, large lots, 2.65c to 2.75c; smaller lots, 2.85c with square nuts, and 3c with hexagon nuts.

Merchant Steel.—The week has brought no new developments in the local market. Specifications continue heavy. Deliveries are slow due to the congestion of orders and the scarcity of cars. Prices are firm carload lots, Chicago delivery, being as follows:

Planished or smooth finished tire steel, 1.96½c; iron finish, up to 1½ x ½ inch, 1.91½c; iron finish, 1½ x ½ inch and larger, 1.76½c, base; channels for solid rubber tires, ¾ to 1 inch, 2.26½c, and 1⅛ inch and larger, 2.16½c; smooth finished machinery steel, 2.01½c; flat sleigh shoe, 1.81½c; concave and convex sleigh shoe, 2.06½c; cutter shoe, 2.35c; toe calk steel, 2.31½c; railway spring, 1.96½c; crucible tool steel, 6½c to 8c, and still higher prices are asked on special grades. Shafting is very strong and an advance is expected. Quotations are without change at 50 per cent off in car lots and 45 per cent in less than car lots, in base territory.

Merchant Pipe.—Effective Dec. 20, iron and steel pipe was moved up one point, equivalent to an advance of $2 a ton. This is the third advance that has been made this year, the first taking place Oct. 12 and the second Dec. 4, the former being for two points, and the latter one point. Specifications are very heavy, but the congestion on mill books and the prevailing shortage of cars are seriously interfering with shipments. We have revised our prices, and quote mill shipments, Chicago deliveries, as follows: ¾ to six inch black steel pipe, 75-35 per cent discount; galvanized, 65-35 per cent discount. From store in small lots, Chicago discounts are 72 per cent to 73 per cent on the base sizes.

Cast Iron Pipe.—The Minneapolis letting for 2,000 tons of cast iron pipe has been postponed to Jan. 9. No other inquiries of importance have developed during the week under review. The market is quiet but firm. We continue to quote 4-inch water pipe, $37; 6, 8, 10 and 12-inch, $36; gas pipe, $1 a ton higher.

Boiler Tubes.—An advance of two points went into effect Dec. 20. This is the first change in boiler tubes made this year. The announcement was not surprising, as it had been expected by the trade for several weeks. Specifications show no indications of diminishing, though deliveries are very slow. We have revised our discounts and quote carload lots, Chicago delivery, as follows: 2¾ to five inches, steel, 66.35; iron, 53.35. On less than carload lots from store, base sizes, the quotations are 58 per cent off for steel; 45½ per cent for iron, and 40½ per cent for seamless tubes.

Wire Products.—Demand continues at high water mark. The suspension for the holidays will be very brief this year as mills are loaded to the gunwale with orders and specifications. Spring wants are coming out several weeks earlier than usual, and it is becoming a task where to find the material to apply on the same. All stocks have been depleted, and the daily output goes into immediate consumption. Prices are very firm, as follows:

Wire nails, $2.15; painted barbed wire, $2.30; galvanized barbed wire, $2.60; smooth annealed wire, $2.30; polished staples, $2.30; galvanized staples, $2.55. Carload lots to retailers, five cents higher; less than carload 15 cents higher.

Coke.—No change is apparent in the local coke market. Demand is almost wholly for spot delivery, and $4.25 to $4.50 ovens is the lowest quotation made.

Old Material.—The freer buying of scrap which has marked the week under review is the outcome of the lower prices that now prevail. Values are from 50 cents to $1 a ton lower than they were a week ago, and they are still receding. This decline has been imminent for some weeks, and

has been withheld only by the ability of dealers to carry their heavy stocks and absorb the large tonnages that have been thrown on to the market in recent weeks. The tightness of the money market, however, and the sharp demand for cars have forced the dealers to unload. Their bubble of high prices has burst and stocks are being unloaded as rapidly as buyers can be found for them. Mill grades are the weakest owing to the large stocks carried by most of the western plants. We have revised our prices, and quote as follows, gross tons being given in the first paragraph:

Old Steel Rails (4 feet and over)	$19.00 to 19.50
Old Steel Rails (less than 4 feet)	18.00 to 18.50
Old Car Wheels	25.25 to 26.00
Old Iron Rails	28.00 to 28.50
Relaying Rails, subject to inspection	29.00 to 30.00
Frogs, Switches and Guards	18.00 to 18.50
Heavy Melting Steel	17.00 to 17.50
Mixed Country Steel	15.00 to 15.50

We quote net tons, as follows:

No. 1 R. R. Wrought	$17.00 to 17.50
No. 2 R. R. Wrought	16.00 to 16.50
Shaft [illegible]	19.00 to 19.50
Dealers' forge No. 1	13.50 to 14.00
Wrought Pipe and Flues	12.50 to 13.00
No. 1 Cast, 150 pounds and less	18.00 to 18.50
No. 1 Mill	10.50 to 11.00
Mixed Busheling (No. 1 & No. 2)	11.25 to 12.75
Country Sheet	9.00 to 9.50
No. 1 Boilers Cut	12.50 to 13.00
Boiler Punchings	16.00 to 16.50
Iron Car Axles	26.50 to 27.00
Steel Car Axles	23.00 to 23.50
Iron Axle Turnings	11.50 to 12.00
Cast Borings	9.00 to 9.50
Mixed Borings, etc	9.00 to 9.50
Machine Shop Turnings	11.00 to 11.50
Railroad Malleable	17.00 to 17.50
Agricultural Malleable	16.00 to 16.50
Stove Plate and Light Cast Scrap	14.00 to 14.50
Old Iron Splice Bars	22.00 to 22.50

CLEVELAND.

Eastern Furnaces Threatened with Ore Shortage.

Office of THE IRON TRADE REVIEW.
BROWNING BUILDING, Dec. 24

Iron Ore.—The Steel Corporation during the past fortnight has covered its outside vessel requirements for the coming season, its action completing the ore contracting, with the exception of one large interest, which will have no difficulty in securing ample tonnage. Engagements have all been made at the rate prevailing during the season just concluded, 75 cents from the head of the lakes, 70 from Marquette and 60 from Escanaba. In settling this rate whatever increase might have been expected by the vessel owner in conformity with the higher price of ore was counterbalanced by the heavy increase in the tonnage which will be afloat on the lakes the coming season. The amount of tonnage covered by the Corporation is not announced, though reports have it that the figure differs little from that of the past season. On the other hand the Pittsburg Steamship Co.'s fleet will be considerably larger, vessels now under construction or contract aggregating a moving capacity of about 2,000,000 tons for the season. Interest in the ore situation is centered in the seemingly certain shortage of a number of eastern furnaces, which have covered for only a part of their 1907 requirements and will have a difficult task in completing their purchases. Furnaces in Eastern Pennsylvania and Virginia, which are dependent upon lake ore and feel the burden of freight charges on raw materials most keenly, are finding it increasingly hard to operate except in the most prosperous times. In the earlier days, when the ratio of ore to iron was 1.8 to one, the freight was a factor of less importance than now when the growing use of lower grade ores has increased the ratio to two to one. These long-haul furnaces must see the assurance of prosperous conditions to be able to contract far ahead with safety; the future is now assured, but the ore has all been sold. The tonnage of iron on lower lake docks is very heavy and consumers in this district will be well taken care of through the winter. Quotations are nominal as follows: Old Range Bessemer, $5.00; Mesabi Bessemer, $4.75; Old Range Bessemer, $4.20; Old Range non-Bessemer, $4.00.

Pig Iron.—Instead of bringing the customary lull in buying, the holiday season, emphasizing the approach of the new year, has brought with it a heavy increase in inquiries, including requests for almost every sort of delivery. It is an admitted fact that a considerable number of foundries in this district have either not covered their requirements at all for the first half, or have secured only a part of their necessary tonnage. In the latter instance, it is largely the result of melting larger tonnages than anticipated at the time contracts were closed. Local interests have practically no spot iron for sale and iron for first quarter delivery is equally scarce. There will probably be some iron available later for second quarter as certain interests have declined to sell to their maximum output. For the third quarter and the last half iron is selling actively at $22 to $23 Cleveland for No. 2 foundry. In view of the fact that furnaces in this district are sold up for the first quarter and that shipments from the south are at best uncertain, recourse will be had to foreign iron in an attempt to meet the urgent demand of the near future, though the condition of the British market indicates that no great amount of assistance will be forthcoming from that direction. Spot iron, where it can be had, is selling at $26 to $27 Cleveland for No. 2 foundry. First quarter iron is almost in the same class, commanding prices on the basis of $25 for No. 2 foundry delivered locally. For the second quarter we quote f. o. b. Cleveland as follows:

Bessemer	$22.35 to 23.35
No. 1 Foundry	23.50 to 24.50
No. 2 Foundry	23.00 to 24.00
No. 3 Foundry	22.50 to 23.50
No. 2 Southern	23.35 to 23.85
Gray Forge	21.00 to 22.00
Lake Superior charcoal	26.00 to 27.00

Coke.—Furnace coke prices have strengthened suddenly and $3.95 ovens is now being quoted, with only limited tonnages procurable. Foundry is firm at $4.00 to $4.25.

Finished Materials. — A general strengthening of the market along all lines is noted. Independent plate interests have booked orders to such an extent of late that no early deliveries are procurable except at fancy prices. An early increase in the prices of the heavier gauges of sheet and the lighter gauges of plates is practically assured. The leading producer of sheets is promising no deliveries short of from 11 to 14 weeks, with a further delay of four weeks if open-hearth material is used. The past week has been one of great activity. Consumers are specifying heavily in order to clear up contracts expiring with the year. In this a stimulating effect has been exerted by recent price advances and practically no tonnage will remain unspecified. New contracts, where there is opportunity for comparison, without exception call for heavier tonnages than during the year just closed. Iron bars are selling out of stock at 2.00c Cleveland and steel bars at 1.90c.

Old Materials.—A distinct lull has characterized the market of the past week, with little buying being done by consumers. We quote Cleveland delivery, gross tons in the first paragraph, as follows:

Old iron rails	$27.00 to 27.50
Old steel rails (over 6 feet)	20.00 to 20.50
Old steel rails (under 6 feet)	19.00 to 20.00
Old car wheels	21.00 to 21.50
Steel boiler plate	16.00 to 16.50
Steel axles	22.00 to 23.00
Malleable iron (railroad)	19.50 to 20.00
Malleable iron (agricultural)	15.50 to 16.00
Heavy steel	18.25 to 18.75
Country mixed steel	16.50 to 16.00
Low phosphorus	24.00 to 25.00

We quote net tons as follows:

No. 1 R. R. wrought	$19.00 to 19.50
No. 1 busheling	15.50 to 16.00
No. 1 machine cast	19.50 to 20.00
Iron axles	26.00 to 27.00
Axle turnings	14.00 to 14.50
Wrought turnings (free from cast)	12.00 to 12.50
Grate bars	15.00 to 15.50
Pipes and flues	15.00 to 15.50
Tank iron	12.50 to 13.00
Hoop and band iron	9.00 to 9.50
Sheet iron	9.00 to 9.50
Wrought drillings	12.00 to 12.50
Stove plate	14.50 to 15.00
Cast borings	9.50 to 10.00

CINCINNATI.

Market is More Active and Prices are Advancing.

December 24.

Pig Iron.—The market has been more active the past week and a strong tone has prevailed with quotations tending upward. A number of large consumers have taken iron for first quarter delivery at $22.50 Birmingham, and some very conservative interests are showing a disposition to contract for their supplies for the last half of 1907. Spot iron is stronger and prices are about one dollar per ton higher than a week ago. Sales of prompt shipment iron are on the basis of $23.00 to $23.50 Birmingham and the offerings are now taken up readily. We quote spot iron as a basis for settling contracts based on our quotations as follows delivered Cincinnati.

Southern foundry No. 1,	$26.50 to 27.00
Southern foundry No. 2,	26.00 to 26.50
Southern foundry No. 3,	25.50 to 26.00
Southern foundry No. 4,	24.50 to 25.00
Southern fdry. No. 1 soft	26.50 to 27.00
Southern fdry. No. 2 soft	26.00 to 26.50
Gray forge	23.00 to 23.50
Northern foundry No. 1,	27.65 to 28.15
Northern foundry No. 2,	27.15 to 27.65
Northern foundry No. 3,	26.65 to 27.15
Jackson County silvery, 8 per cent	31.15

For delivery in the first quarter prices range from $22.00 to $23.00 Birmingham and there appears to be a ready sale for the limited tonnage remaining for sale for this delivery.

For the second quarter a uniform price of $20.00 Birmingham is the rule for most brands. For the last half of the year quotations range from $18.00 to $19.00 Birmingham with third quarter quoted at $18.50 to $19.00 and last quarter at $18.00 to $18.50, but where a customer wishes to buy clear through the last half the price is a compromise between $18.00 and $19.00 Birmingham.

Southern Ohio furnaces are well sold up for the first half of the year and there are so few quotations on this class of iron that it is difficult to quote even a nominal figure. For the last half of the year, furnace prices range from $21.00 to $22.00 for No. 2 foundry.

Sales agencies are now careful as to commitments for any delivery, as furnaces show a dispositon to advance their views without much warning and a quotation made today may not be good tomorrow. Deliveries on contracts are still behind owing to lack of cars. Some Ohio Silvery 8 per cent sold at $30.00 at furnace this week. The lower grades of southern iron are relatively slightly easier than No. 1 and No. 2 foundry and in some instances a little better than the usual differences in the grades can be done on No. 3, No. 4 and gray forge. Spot gray forge is quoted at $20.00 Birmingham, first quarter $19.00 and second quarter $18.00 to $18.50 Birmingham. We quote for second quarter delivery, delivered Cincinnati as follows:

Southern Foundry No. 1	$23.50 to 24.00
Southern Foundry No. 2	23.00 to 23.50
Southern Foundry No. 3	22.50 to 23.00
Southern Foundry No. 4	21.50 to 22.00
Southern Foundry No. 1, soft	23.50 to 24.00
Southern Foundry No. 2, soft	23.00 to 23.50
Gray Forge	21.00 to 21.50
Northern Foundry No. 1	24.15 to 24.65
Northern Foundry No. 2	23.65 to 24.15
Northern Foundry No. 3	23.15 to 23.65
Jackson County Silvery, 8 per cent	28.15 to 29.15

Finished Material.—There is a good demand from store and the market is active but unchanged. Orders are being filled at the following quotations here:

Angles 3 x 3 and over, 2.15c to 2.25c; beams and channels 15 inches and under, 2.15c; small angles and architectural channels, 2.10c base; plates ¼ inch and heavier, 2c; 3-16 inch, 2.10c; No. 8, 2.10c; sheets (blue annealed) No. 10, 2.15c; No. 12, 2.20c; No. 14, 2.25c; No. 16, 2.35c; box annealed sheets Nos. 18 and 20, 2.50c; Nos. 22 and 24, 2.60c; Nos. 25 and 26, 2.65c; No. 27, 2.70c, and No. 28, 2.80c. Iron and steel bars, 1.95c base; boiler tubes, 67 per cent off base; turn buckle 45 per cent off; rivets, 3.15c base; cold rolled shafting 45 per cent off list; steel tire, 2.10c base.

Coke.—There is quite a scramble for spot coke with none to be had as all the coke that can be had is applied on contracts. Shipments are not improved and consumers are calling for deliveries with ovens unable to meet the calls for lack of cars. While quotations are for prompt shipment, they are largely nominal. Prices in the leading coke producing districts are as follows.

Wise County, Va. Furnace Coke prompt shipment	$3.50 to 3.75 per ton
Wise County, Va. Foundry Coke	4.00 to 4.50 per ton
Pocahontas Furnace Coke prompt shipment	3.25 to 3.50 per ton
Pocahontas Foundry Coke	3.50 to 4.00 per ton
Connellsville Furnace Coke prompt shipment	3.25 to 3.50 per ton
Connellsville Foundry Coke	4.15 to 4.50 per ton
New River Foundry Coke on contracts	3.50 to 4.00 per ton
New River Furnace Coke, prompt shipment	2.75 to 3.00 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.70 to $1.75 per ton on $9.00 pig iron, plus 19 to 20 per cent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market is active with a good demand from all sources and while prices are unchanged there is a firm tone prevailing. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$18.50 to 19.00
Cast machine and foundry, net tons	18.50 to 19.00
Old iron rails, gross tons	26.00 to 27.00
Old steel rails, gross tons	19.00 to 20.00
Old short lengths, gross tons	19.00 to 20.00
Old iron axles, net tons	26.00 to 27.00
Heavy melting scrap, gross ton	20.00 to 21.00
Stove plate, net tons	14.00 to 14.50
Wrought turnings, net tons	12.50 to 13.00
Cast borings, net tons	9.00 to 9.50
Car wheels, gross tons	21.50 to 22.00

PHILADELPHIA.

Demand for Both Pig Iron and Finished Material Very Strong.

December 25.

Pig Iron.—Despite the holiday season there is no apparent lull in activity, and buying for the last half of 1907 continues the feature of the market. In addition to the heavy sales of basic referred to last week, when over 50,000 tons were purchased principally by Coatesville interests, there have been further large sales of basic in eastern territory for the last half of 1907, bringing the aggregate up to fully 100,000 tons. Most of these later purchases were made on the basis of $23 a ton at the furnace, which marks a decided advance in price. Orders for smaller amounts of all grades of iron for delivery in the third and fourth quarters continue in large volume. Incredible as it may seem, some furnaces report that they are already practically sold up to their full capacity for the third quarter and are refusing any business for that period. All recent developments tend to show that consumers are showing careful judgments in buying so far ahead. Reports show that many furnaces are working poorly under the continual strain to which they have been put, and are falling behind badly in deliveries. The southern situation is very unsatisfactory, owing to inadequate railroad facilities and inefficient labor, and the relief that is now experienced from importations of English and Scotch iron is not likely to continue beyond the spring, in view of the steady rise of price on the other side. Many large consumers have so greatly increased their plants that the demand for pig iron is bound to be much larger in 1907 than ever before. Prices show an increase for some grades over last week, and may be quoted as follows for the last half of 1907. Earlier deliveries being subject to premiums varying from 50 cents to $2, according to the exigencies of the consumer and the supplies of the furnace:

No. 1X Foundry	$26.00 to 26.75
No. 2X Foundry	23.75 to 24.75
No. 2 Plain	23.25 to 23.75
Standard Gray Forge	22.00 to 22.50
Basic	23.00 to 23.75
Low Phosphorus	27.00 to 28.00

New Material.—Advances in finished products mark the movement to make

less striking the disparity that has existed for some time between the prices of pig iron and of the material manufactured from it. Especially vigorous is the demand for floats, orders for which are crowding the mills. It is only a few days ago that a mill near Philadelphia was obliged to refuse an order for 10,000 tons because of the utter impossibility to make deliveries in the time desired. Swedish iron has been advanced $2 a ton in keeping with this movement. New business is coming in steadily in all lines, the lull customary at this season of the year being hardly perceptible. Iron and steel bars are especially in demand at rising prices. These may be quoted as follows:

Beams, channels and angles according to specifications, 1.83½c to 2c; refined iron bars, 1.88½c to 1.93½c; steel bars, 1.83½c to 1.88½c; plates, 2.03½c to 2.08½c.

Old Material.—While buying is not remarkably active the tendency of prices is still upwards, and the market continues very firm and strong. The diminution in activity is only natural at the Christmas holidays, and with the appearance of the railroad lists next month the market is expected to go on rising. Prices may be quoted as follows:

Old steel rails	$20.00 to 20.50
No. 1 steel scrap	19.75 to 20.25
Old steel axles	23.50 to 24.00
Old iron axles	31.00 to 32.00
Old iron rails	27.00 to 28.00
Old car wheels	22.00 to 23.00
Choice scrap, R. R. No. 1 wrought	23.00 to 23.50
No. 1 yard scrap	20.00 to 20.50
Machinery scrap	20.50 to 21.00
Low phosphorus scrap	23.50 to 24.00
Wrought iron pipe	17.25 to 17.75
No. 1 forge fire scrap	17.00 to 17.50
No. 2 forge fire scrap, ordinary	12.50 to 13.00
Wrought turnings	16.50 to 17.00
Axle turnings, heavy	17.00 to 17.50
Cast borings	13.50 to 14.00
Stove plates	16.75 to 17.25

NEW YORK.

More Sales of Pig Iron for Second Quarter and Last Half.—Very

Office of THE IRON TRADE REVIEW.
ROOM 1315, No. 150 NASSAU ST., Dec 23.

Pig Iron.—Holiday festivities have as yet had little influence upon the pig iron market. The demand for metal which can be supplied quickly is as brisk as ever, sales have been quite as heavy as in the last few weeks preceding and prices are sufficiently irregular to lend keen interest to every transaction. The more important developments have been extensive selling for the last half by New York state furnaces with subsequent advance of $1 a ton on foundry grades, renewed buying of basic at prices higher than any yet attained, and considerable transactions in gray forge, both for foundry and mill purposes.

There has been the accustomed run of business in prompt iron, which is taken when offered usually in comparatively small lots and at all sorts of prices ranging from $25 in exceptional cases to $28.20 delivered as the other extreme. There are very few furnaces which have any iron of foundry grades to offer for first quarter, either in the north or in the south, and most of the demand in the east for spot or nearby shipment is supplied by foreign metal at $24 and $25 on the dock.

Sales of basic iron have been considerable, amounting to 25,000 or 30,000 tons. New Jersey furnaces disposed of about 10,000 tons for the third quarter, and other sales for the same delivery reached a total of more than 5,000 tons. In addition there were purchases for the third quarter amounting to fully 10,000 tons, all at prices higher than any hitherto quoted.

Between 10,000 and 15,000 tons of northern gray forge changed hands in the local market during the week. Most of the sales were for delivery in the first half and mainly by New Jersey furnaces, producers realizing $23.50 and $24 delivered.

Business in third and fourth quarter foundry iron has not been done without competition. Many purchasers have been able to secure substantial concessions. The bulk of the sales of New York state iron were made on a basis equivalent to $23 at New York city, and there were some sales of southern No. 2 at $18, Birmingham, although the chief producers held firmly at $19, and there were not a few transactions at $18.50 and $19, mainly, however, in connection with contracts for second quarter deliveries at the same price. The New York state furnaces which sold most heavily remained in the markets only a very few days, quickly advancing their prices $1 per ton when a goodly number of contracts had been made.

Ferro-manganese is reported a little stronger, prices ranging from $85 to $90 acording to quantity and delivery.

There is some demand for small lots of foundry coke for early shipment, otherwise the market is quiet. Last week a contract was made for 72-hour foundry coke for shipment throughout the entire year, the price being $4.25.

The following are prices of pig iron at tidewater for forward delivery.

Northern Foundry No. 1	$24.00 to 26.00
No. 2 Foundry	23.50 to 25.50
No. 2 Plain	23.00 to 25.00
No. 1 Southern Foundry	23.50 to 27.00
No. 2 Southern Foundry	23.00 to 25.50
No. 3 Southern Foundry	22.00 to 24.00
No. 4 Southern Foundry	21.50 to 23.00

Finished Iron and Steel.—The railroads have again occupied the center of the stage in steel markets. Contracts for rails and bridges while not numerous in the form of actually signed orders, are plentiful in prospect. The inability of the great transportation lines to handle the traffic offered has brought them into the market for rolling stock and motive power and will compel them to keep the rolling mills busy on rails, shapes and plates for months to come. In the meantime there is no lack of work at the mills. The demand for light rails was never better, and specifications for standard sections are in good volume.

The demand for structural steel has improved somewhat during the week. There have been more purchases of small lots and inquiries for important structural work have been more numerous. At the present writing the contract for the approaches to the Blackwell's island bridge amounting to 8,300 tons of steel has not yet been let. Contract No. 17 for the Erie barge canal, three bridges, about 1,300 tons each, are also still to be closed. The American Bridge Co. has taken a number of contracts, nearly all less than 1,000 tons in quantity, including two buildings in San Francisco, a highway bridge in Massachusetts and a number of railroad contracts.

Among the sales of rails reported while the last issue was on the press were, 5,000 tons to the Monon, and 15,000 tons to the Great Northern.

The demand for plates for pipe manufacture is exceptionally heavy. Ship builders and manufacturers of cars are also good customers, so that there is no lack of work at the plate mills. The range of price between eastern and western manufacturers is as great as ever, one producer in the east demanding fully $6 per ton more than his rivals in the interior. Bars, both steel and iron, are in good demand. There were a number of sales of soft bars during the week, several of 1,000 tons and more, and others are pending.

The following are prices at tidewater: Angles 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.94½c to 2.14½c; flange, 1.94½c to 2.14½c; marine boiler, 2.41½c; refined iron bars, 1.84½c to 1.89½c; soft steel bars, 1.74½c to 1.84c; sheets, No. 28 black, 2.60c.

Old Materials.—The market is firm, but in general the activity is less. There were more sales of heavy melting steel at $19.50 delivered at the buyers mill in Eastern Pennsylvania. Heavy cast scrap is stronger with

very little available in the local yards. The following are prices approximately f. o. b. tidewater.

Old iron rails	$25.00 to 25.50
Old steel rails, long lengths	17.50 to 18.50
Old steel rails, short pieces	16.50 to 17.50
Relaying rails	26.00 to 27.00
Old car wheels	21.00 to 23.00
Old iron car axles	29.00 to 30.00
Old steel car axles	21.00 to 21.50
Heavy melting steel scrap	18.00 to 18.50
No. 1 railroad wrought scrap	20.00 to 20.50
Iron track scrap	18.00 to 19.00
Wrought pipe	14.50 to 15.00
Cast borings	11.00 to 11.50
Wrought turnings	15.25 to 15.75
Heavy Cast Scrap	19.00 to 21.60

BUFFALO.

Stronger Demand for Last Half of Iron.—Prices Firm but Unsettled.

December 24.

Pig Iron.—There has been a tendency toward unsettled prices this week, but they remain firm at the same figures as were quoted last week. It would not surprise local furnace operators if there was another advance in the near future, although they do not look for as big an advance as occurred the week previous, when there was a general advance of one dollar a ton. Every day third and fourth quarter business becomes stronger and buying more general, showing a feeling of uncertainty among consumers regarding the last half supply. Another reason given for the uneasy condition of the pig iron market in this district is found in the reports, apparently authoritative, that new industries would be in operation in this vicinity within the next year which would clean up the free iron and make a big hole in the product of the local furnaces. These matters are just at present receiving a good deal of attention locally and will have an important bearing of the 1907 market.

Free iron, or iron not contracted for in advance, is about all disposed of, only an occasional car being sold now. Had the strong demand been foreseen the furnaces would not have sold as close as they did and in contracting to place the 1907 production, it is stated, more free iron will be provided than has been in the past. Southern iron continues coming into the market here at high prices, the manufacturers of thin plate finding its use essential to their needs.

This district is suffering, like many others, from lack of cars for getting out the iron from the furnaces to the consumer. This trouble could hardly be considered serious in the Buffalo district as yet, but there is some apprehension in iron circles as to the remainder of the winter. Snow, which has been falling in heavy quantities in outlaying districts, together with the car shortage will, they fear, cause embarrassing delays. Efforts are now being made to provide car facilities for future shipments, which will remove any chance of loss through delayed shipments. We quote for last half delivery as follows:

No. 2 Plain Foundry	$22.00 to 23.00
No. 2 X Foundry	22.50 to 23.00
No. 3 Foundry	22.00 to 23.00
Malleable Bessemer	23.00 to 23.50
Gray Forge	21.50 to 22.00
Charcoal	25.00 to 26.00

ST. LOUIS.

Improved Inquiries for Last Half.—Delayed Deliveries.

December 23.

Pig Iron.—Conditions do not show any improvement over last week, deliveries still being far behind because of the inability to get cars and to get cars moved.

Southern No. 2 spot today commands $23.50 at Birmingham and $23.00 for January, with 50 cents less for February and March. Second quarter business is being done on a basis of $19 for No. 2 soft while last half is quoted at $18.50.

With the exception of a few furnaces which have suffered on account of inability to procure new material because of the car shortage, nearly all the southern furnaces have been running full blast the last three months to take advantage of the high spot prices. The result is that several of them will have to go out of blast soon

Inquiries for the second half improve and there is little doubt that the entire tonnage of the furnaces will be purchased months ahead at the present high level.

Quotations, including the freight rate from Birmingham range as follows:

Southern No. 1	$27.00 to 27.50
Southern No. 2	26.50 to 27.00
Southern No. 3	26.00 to 26.50
Southern No. 4	25.50 to 26.00
Gray Forge	25.00 to 25.00

Coke.—The car shortage has caused another advance in coke, the price being quoted today at $7.50 to $7.60. Several large orders of smithing coal were also booked.

Finished Material.—The newest project to attract attention is the proposed Wright building which is to be 19 stories tall. It will require about 3,000 tons of steel.

METAL MARKET.

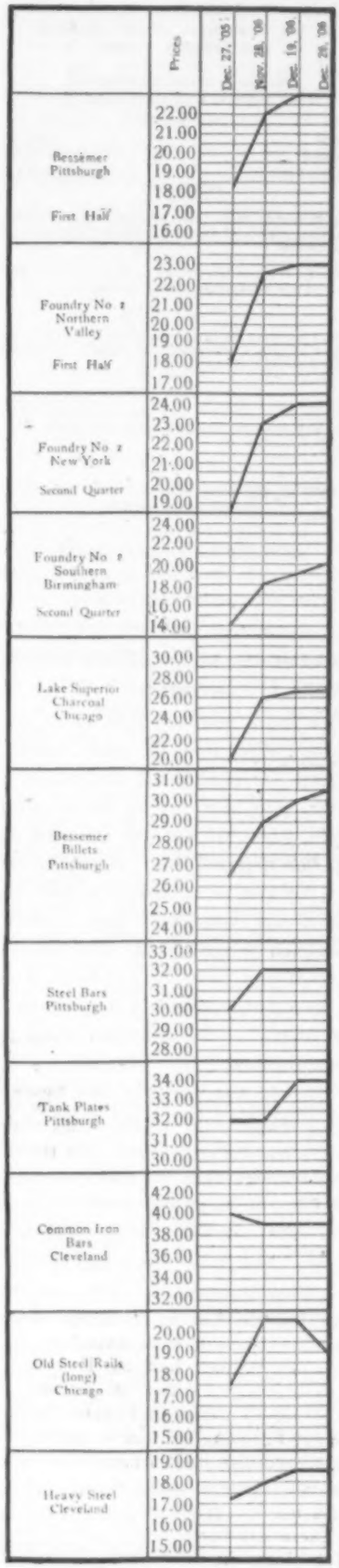
ST. LOUIS.

December 22.

Lead is steady today at $6 for Missouri brands. Corroding is held at $6.10.

Spelter is firm at $6.52½. At this figure 100 tons were sold today.

PRICE CHART.



THE IRON TRADE REVIEW

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THE INCREASE IN LIGHT STEEL FORMS.

One hears now and then of an unusually large iron or steel casting, forging, or rolled form, and makes a mental note that this is the heaviest single piece he has yet observed in the line referred to. Naturally as men become more ambitious and facilities are improved larger single pieces can be turned out. The general trend of iron and steel consumption is in the other direction, i. e., the average weight of the individual piece is being reduced.

The time was when the bulk of iron and steel produced went into large sections, such as rails, structural shapes, boiler, ship and tank plate and the like. A relatively small tonnage went into merchant forms, wire and sheets. The ratio between the two is constantly changing. Rail sections have become heavier, although there has not been much change since the hundred-pound rail came out, as it is not being called for in greatly increasing proportions in the last couple of years, and the total tonnage of rails has increased. Rails nevertheless constitute a smaller percentage of total steel production than they ever did. Structural tonnage has increased, but not as rapidly as total tonnage, and forms are built up in cases where formerly they were rolled in one piece. Plate tonnage has increased, but not so rapidly as sheet tonnage.

The average weight of castings has increased, but this has been due to the tendency to make small articles from rolled or drawn steel instead of by pouring. Many of the uses of wire, sheets and hoop and band products are uses which formerly were served by small castings. Possibly hardware specialties stand pre-eminent in this direction, including such common article as hinges, locks, escutcheons, etc.

Outside of this displacement of small castings, the smaller rolled and drawn forms have grown independently. It is improbable that the antiquarian will ever succeed in finding the first record of the tin can being called ubiquitous, but barring the logic it may be called more ubiquitous than ever. Wire tends more and more to small articles, or to relatively large ones, such as wire rope, which in turn are made of small pieces. Concrete construction, instead of tending to the reduction of iron and steel tonnage, calls for the lighter sections quite universally, while it displaces the larger sections in much smaller ratio. Reinforced concrete construction may use, at a guess, one-eighth as much steel, for reinforcing, as it would be replacing if the original construction were steel, but it does not replace, but rather extends, the use of steel. A reinforced concrete wall may be a foot thick where five feet of plain concrete would have been required, but probably would not have been used at all. Reinforced concrete, theoretically, replaces much more concrete than it does steel, but practically it increases the consumption of both commodities.

A few pieces of furniture have long been made of sheet metal; today there are few which are not so made, and their use is growing at a great rate. The fact that a railroad passenger car can be built of practically nothing but steel shows at once the possibilities.

This development towards a greater proportion of the small and light pieces shows that the whole iron and steel industry, comprising all lines of production and fabrication down to the ultimate consumption, is growing at a much more rapid rate than the tonnage returns, whether of pig iron or crude steel, would indicate, great though that growth is. More and more labor is being employed. Where the service of one man for one hour has been dispensed with, in the production of a ton of crude steel, the labor of one man for a whole day has been brought into requisition, to more finely finish that ton of steel, once it is made. Steel is calling for more manual labor per ton every year.

THE UNIONS AND TRAINING SCHOOLS.

Unionism and the training school idea do not harmonize well, as every one knows, but the opposition of labor has seldom been expressed so frankly as it was at an exceedingly interesting meeting held recently in Springfield, Mass. The labor leaders of western Massachusetts appeared before the state commissioners of industrial education and expressed themselves as bitterly opposed to any and all institutions for the training of skilled workmen.

The president of the central labor union explained that the workingman had much to lose and nothing to gain from the schools maintained by the state, and advanced a number of characteristic arguments to prove his point. The most heinous offense against unionism was the saving of time, the boy gaining as much training in the six months' course in the schools as an apprentice could get in several years under union rules. The interests of the rising generation are, of course, a negligible thing in considering the welfare of the labor monopolists. A second argument which will appeal with equal force to the fair-minded American, is that the school graduates are willing to work for smalled wages than men who have served a longer apprenticeship receive. To clinch matters the business agent of a local union told a pathetic story

about a plumbers' strike which had failed because the school had furnished men when the contractors and the public urgently needed them.

It is needless to say that the un-American plea of these typical laborites was received with scant encouragement. It is a settled principle in the union camp to produce a shortage of skilled labor for the benefit of the few and at the expense of the youth and the industries of the country. If it is prejudicial to the public good to corner wheat, how can people be expected to sympathize with a movement which not only aims to monopolize a necessary commodity but also strives to interfere with future supplies?

A WORD FOR THE MASSED FORM IN BUSINESS.

There have been so many attacks upon combinations of capital and industry by clergymen, college professors and others who are supposed to lead in clear, independent thought that it is refreshing to hear a word for the other side from the same non-commercial source. E. Benjamin Andrews, former president of Brown University and at present chancellor of the University of Nebraska, in an address recently delivered in New York used the following words. "At the present time great business enterprises are conducted in massed form. All political economists are agreed that the massed form of business must remain. Business can no longer go on in the old go as you please, competitive basis. Organization is imperative."

In other words the statesmen who are trying to resolve the great industrial combinations into their constituent units and are doing their best to have all competition regulating agreements declared illegal, are attempting to turn the wheels of progress backward. It is beginning to dawn upon even those who are not in business that there may be too much of that good thing, competition. Arbitrary slashing of prices, unscrupulous tricks of salesmanship and extreme reduction of cost, when carried to excess, become destructive forces bringing evil upon consumer and producer alike. The commercial world has been taught this lesson at great cost, and is everywhere seeking to soften the rigors of industrial warfare.

The drift toward co-operative methods away from the cut-throat plan of the past is not peculiar to this country. The true home of the "trust" is Germany, where the government encourages price control agreements and even the little foundryman has his schedule of authorized quotations. That country seems determined to conquer the world commercially. Which merchant or manufacturer is most likely to succeed in the present international contest, he who is permitted to thrive in peace at home, or he who is compelled to fight at home as well as abroad?

PROSPERITY, DIFFICULT COLLECTIONS AND EXPANSION.

It is an obvious fact that a period of record business activity, such as the present, is always an era of expansion, and it is equally true that this is generally overdone. New, well-equipped plants, half-idle or deserted, are invariably scattered about the country to mark the passing of a spurt of unusual prosperity and proclaim the shortsightedness of promoters to whom it never occurred that depression was bound to come, with a reduced volume of business, keener competition for contracts and closer margins of production. Record incorporation figures and new bonding issues, building permits and the condition of the money markets,—all go to show that the active business conditions of today are being taken advantage of to the utmost. It is not to be denied that, for the most part, the expansion movement is based on conservative estimates of probable future demands, this being especially the case with the larger establishments, to which a more or less accurate forecast of conditions is possible. On the other hand, however, there is ample evidence that in certain lines much of the present day expansion is not on the safe and sound basis to endure.

A specific case will illustrate. During the comparatively quiet times of 1904 the owner of a fairly large western foundry became badly in arrears in payments for his pig iron supply. The account dragged along for several months until business improved, when, to save him from bankruptcy, the selling house agreed to an arrangement whereby he was to meet all new obligations as they arose and out of the balance certain to acrue from capacity bookings at high prices was to make as large payments as possible on the old account. At first the plan worked well, but a short time ago remittances stopped suddenly. The pig iron house wrote a vigorous demand for settlement and the foundryman, much to its surprise, replied that this would be impossible, as he was just then engaged in doubling the capacity of his plant and could not spare the money.

This, it is to be hoped, is an extreme case, but there is very general complaint among furnace interests that much of the present new construction work and equipment installations is being made in this manner, out of current earnings, while the furnace whistles for its accounts, both old and new. As a consequence, iron producers are accustomed in times such as these to exercise extraordinary watchfulness in this direction. They are finding that collections are by no means as easy as brisk conditions would indicate, customers of long standing and unchallenged credit frequently pleading the fact that they are able to realize surprisingly little on "thoroughly good" accounts aggregating large totals.

Bearing in mind that generous exceptions must always be made, it is probably true that in the smaller class of foundries a less acute business ability is displayed than in almost any other line of manufacturing. These plants are largely developments of the one-man shop; the man now at the head was generally the founder and original molder. The castings turned out may be above criticism, but too often there is no intelligent idea of what they have cost. What is needed is a co-ordinate official to look after the securing of orders, the purchase of materials and the financial affairs of the concern. This, of course, is the plan pursued in the larger plants, but it is unusual in the smaller, and they are the ones most liable to suffer from the expansion fever. With credit often overtaxed and fixed charges increased, their predicament in the lean years to come can be imagined. There is no cause to discredit legitimate extension, but it must be based on an accurate forecast of future business conditions, not on the abnormal situation of today, or it will bring disaster.

SOUTHERN PIG IRON DURING THE YEAR,

WHICH CLOSES WITH FURNACES IN STRONG POSITION,

Well Prepared to Resist Decline in Prices.— Buyers Are Urging Delivery on Contracts.

By Joseph D. Morten.

A retrospect of the southern market for the past year brings some light on the present situation. Perhaps the most significant fact of value is that buying for delivery in 1907 commenced about the middle of August. A steady upward trend of prices indicates that a good tonnage has been booked. This being of record, it must be apparent that the year 1907 begins with furnaces in strong position. An additional fact is that buying for the second half of 1907 commenced in November of 1906. This suggests that furnaces will be prepared to resist a decline in prices for a long time even under a falling off in demand.

Another fact which strengthens the above suggestion is that at the beginning of the year the market declined only one dollar per ton after a campaign of buyers holding off for about six months, and this decline was a most surprising one and is not yet quite satisfactorily explained.

The year may be divided into two periods: The first, from January to June 14, which covered the time that a $14.00 Birmingham basis was practically maintained; the second, from June 15 to December 31 covering the beginning of the buying movement started on the break in prices to $13.00 Birmingham and the continued rise from that figure to present quotations, which for prompt shipment show an advance of from $9.00 to $10.00 per ton.

The year 1906 began with production of pig iron heavy, and consumption on a liberal scale. The price had been advanced on southern iron to a $14.00 Birmingham basis and ruled firm at that figure. Buyers had bought with freedom for the first quarter and into the first half of the year and with these orders on their books southern producers were complacent as to the future. There was but little interest shown by buyers in January and the only trading was for moderate tonnages to cover immediate wants of buyers. The selling interests were unable to determine the cause of buyers' disposition to stay out of the market.

February brought no improvement in demand and low grades were beginning to accumulate in southern furnace yards. It looked as though buying must improve or prices would recede. The market was disturbed by a threatened coal strike and the probabilities and possible effects of such a conflict were matters of discussion. Consumption was going on at a maximum rate, but there was an apparent sufficiency of iron for all demands, which tended to keep buyers indifferent as to the future.

With the advent of March the market weakened with low-grade iron selling at concessions, which was followed by a general irregularity and $13.75 Birmingham was done. Leading producers were endeavoring to hold the market up and maintained prices above current quotations. Freight rates from the south were advanced 25 cents per ton effective March 1. This feature had but little effect on the situation as northern iron was relatively higher than southern. There was quite an active business in this month, but sellers were so anxious for orders while buyers were in a mood to purchase that $13.50 Birmingham was touched by the close of the month.

April opened dull again and it looked as though the foundry trade was covered for the first half of the year. The leading cast iron pipe makers bought a large tonnage which tended to encourage sellers but there was no general demand. The northern furnaces had now worked down to a basis of $16.00 at furnace as compared with $17.50 at the beginning of the year.

The month of May found the situation unchanged. There was just about enough demand to keep the market from declining. Buyers refused to purchase for the second half of the year. Southern furnaces held tenaciously to prices and on May 24 several large producers and some of less importance formed an agreement to maintain a $14.00 price.

This agreement held until June 14 when the combination was dissolved and a $13.00 Birmingham basis resulted. This decline came at a time when buyers were about ready to cover for the second half of the year. The result was a heavy buying movement, which continued in such good volume that by July 5, many southern makers advanced prices to $13.50 Birmingham. There was a gradual strengthening of prices which met with some resistance on the part of belated buyers who had not covered on the big decline. Furnaces were now well sold up for July, August and September with some tonnage booked for later deliveries.

The month of August furnished developments which presaged the present strained conditions. Buying was heavy with prices advancing rapidly. There was talk of a shortage of iron. Deliveries were disappointing. Spot iron was in urgent demand and began to command a premium. Contracts for first quarter of 1907 were taken first at $14.00 Birmingham, then $14.50 and by the close of the month the minimum figure was $15.00 with spot iron bringing $15.50 to $16.00 Birmingham.

September and October witnessed a continuance of the firmness with prices advancing rapidly. Some southern producers had stopped taking business entirely in order to have spot iron for sale as soon as they could fill contracts on their books.

Maximum prices were reached at the close of the year when southern spot sold at $22.00 to $23.00 Birmingham; first quarter of 1907 brought $22.00 Birmingham, with January shipment at a slight premium; second quarter sold at $19.00 Birmingham and interest was shown in the last half of the year at $17.50 to $18.00 Birmingham.

The year closes with cars scarce and deliveries disappointing. Buyers are calling upon sellers to hurry forward iron on contracts. Melters are using scrap in place of pig iron when they can. Any large blocks of prompt iron that are available generally go to some big consumer quietly. Furnaces have a large tonnage booked for first half of 1907 and buyers are believed to be fairly well covered for the same period. In this respect the year 1907 will begin under very similar conditions to 1906, except that the price level is much higher now than a year ago, and more iron has been sold for the first half of the year.

THE GREAT INDUSTRIES OF PENNSYLVANIA.

It is an old story that Pennsylvania has long been noted as the leader of all the states in the mining of coal, the manufacture of coke, and the production of iron and steel, writes James M. Swank in the current *Bulletin* of the American Iron & Steel Association. Its leadership in these great industries in 1905 was well maintained, as will be seen by the following table which gives its percentage of the total production of coal and coke and of various leading forms of iron and steel in the whole country in that year of general industrial activity. (Coke is given in net tons: other products in gross tons.)

Products, 1905.	Production in U. S.	Production in Pa.	Penna.'s per cent.
Coal	350,820,840	175,065,613	49.9
Coke	32,231,129	20,573,763	63.8
Iron ore	42,526,133	808,717	1.9
Pig iron	22,992,380	10,579,127	46.0
Steel, all kinds..	20,023,947	11,040,423	55.1
Rails	3,375,929	1,115,841	33.0
All other rolled iron and steel	13,464,086	7,802,449	57.9

Contrary to common belief Pennsylvania has not been a large producer of iron ore since the rich ores of the Lake Superior region came into general use in the manufacture of Bessemer pig iron about 1880. Its small production in 1905 is included in the table. And yet Pennsylvania was first of all the states in the mining of iron ore for more than a century down to and including the census year 1880. In 1889 it fell to the third place and in 1905 it occupied the sixth place among the iron-ore producing states, having advanced in that year from the ninth place in 1904. Its production of iron ore in 1905 was 808,717 tons, but in 1904 it was only 397,107 tons. In 1904 its percentage of the total production was 1.4 and in 1905 it was 1.9.

It is not necessary to comment on the prominence of Pennsylvania as a producer of iron and steel except to call attention to its extraordinary percentages of the total production in 1905 as they are shown in the table: pig iron, 46.0 per cent; all kinds of steel, 55.1 per cent; all kinds of rails, 33.0 per cent; all other forms of rolled iron and steel, 57.9 per cent. Of the production of coal in Pennsylvania in the year mentioned in the table 69,339,152 gross tons were anthracite and 105,726,461 tons were bituminous; the total was 175,065,613 tons, or 49.9 per cent of the country's production. Of the total production of coke in the same year 63.8 per cent was made in Pennsylvania. The iron and steel industries of the whole country and particularly of Pennsylvania have been the most potential of all influences in developing the coal and coke industries of this state. Nearly all the bituminous coal and coke produced in Pennsylvania is to be credited to Western Pennsylvania. As is well known, practically all the anthracite coal produced in the United States is mined in Eastern Pennsylvania.

SOUTHERN PIG IRON.

All Efforts Directed Toward Shipments, Yet Iron Stocks Increase.

Birmingham, Ala., Dec. 24.

All business in the pig iron mart in the southern territory, save as to the shipping of the product to keep up as nearly as possible with contracts, has been suspended for the holidays. Railroad officials have promised that there will be little loss of time on account of the holiday but the manufacturers of iron are not looking for an extensive movement of the product this week. The production at the furnaces will not be curtailed much on account of the season. A change in weather is having some effect on the raw material supplies. The pleasant weather conditions which have prevailed for many weeks have changed some. However, it is believed that there will be an average output at furnaces.

Iron quotations are holding up well in this district. No. 2 foundry for delivery during the third quarter in the coming year is still quoted at $19 per ton. None of the furnace companies in this district are in position to consider much business, if any, for the second quarter of the coming year. Such companies as do not handle business beyond three months are in a position to do a little trading, but it is not as extensive as one might expect.

The Bessemer Foundry & Machine Co. is rushing castings for the rebuilding of No. 4 furnace at Ensley of the Tennessee Coal, Iron & Railroad Co. plant. The furnace will be ready for operation within four months. Two furnaces at Bessemer are being repaired and will be ready for the torch inside of four weeks. Two other furnaces in this district will be ready for operation again after the middle of next month.

The furnace yards show signs of still more iron, the accumulation being noticeable. Pictures taken of some of the furnace yards in this district recently present views similar to those taken three years ago, before the domestic demand for the product became so steady.

CANADIAN RAILWAY WORK.

Light Grades on Grand Trunk.—Two Manufacturing Plants Fail.

Toronto, Can., Dec. 22.—The annual report of the Trans-continental Railway Commission, which has charge of constructing the eastern section of the Grand Trunk Pacific railway, was recently presented to Parliament. Chief Engineer Lumsden stated that the railway is the first in Canada over 300 miles long, which has, in the first instance, laid out its line for construction with grades not exceeding four-tenths of one per cent adverse to eastbound, and six-tenths of one per cent adverse to westbound traffic, and with curves of a minimum radius of 1,433 feet—except in a few cases where curves of 955 feet radius were obtained. The cost of construction will be much greater than would have been necessary, had one per cent grades been used, but the immense advantage in operating such a line will warrant the extra outlay. Chief Engineer Lumsden reporting on the country through which the line will pass, stated that in northern Ontario a large number of bridges would be required on account of the numerous rivers and streams to be crossed.

At the works of the Dominion Iron & Steel Co., Sydney, N. S., a Bessemer converter is being installed. The machinery is being put in by a force of skilled employes of the Pennsylvania Engineering Co.

A winding up order has been granted by the court against the William Hamilton Mfg. Co., of Petersborough, Ont., manufacturing engines, boilers and machinery, on the application of the curator of the Ontario bank to which the company owes $66,200. The employes, numbering 225, are also creditors for overdue wages. The company was formed in 1883 with an authorized capital of $200,000, of which $180,000 was issued.

The McLachlan Gasoline Engine Co., Ltd., of Toronto, has been declared insolvent and a winding up order issued against it on petition of Wm. P. Bull, a director and holder of $2,000 stock. The company had a nominal capital of $100,000 but the paid-up subscriptions are placed at only $42,000. The cause assigned for the failure is inability to obtain orders by reason of the faulty construction of its engines.

The Keystone Drop Forge Works of Philadelphia has filed an increase of capital stock at the capitol at Harrisburg.

BRITISH TOOL MARKET

Threatened Through Delay in Delivery of American Products.

The market for standard American machine tools in Great Britain, according to Consul Albert Halstead, of Birmingham, is threatened by the inability of manufacturers to make early deliveries, this fact outweighing that of the acknowledged superiority of American products, through which the market had been gained.

"British manufacturers," says the consul, "are, to a large extent, buying tools that can be delivered immediately, rather than postpone the reconstruction of their works. British tool makers, who have heretofore pushed their own designs, noting the inability of American machine tool makers to fill orders promptly, as well as the financial success of several British firms in copying American tools, are now spurred on to make tools on American models. The prices for American standard machine tools have also advanced 10 to 15 per cent in the last twelve months.

"The delay in the delivery of any reputable American lathes and milling machines averages now from three to six months. Until quite recently these tools were kept in stock and a delay of six weeks was unusual. The delivery of universal milling machines is now made in from six to nine months and gear-cutting machinery often can not be obtained under twelve months. When they can not be assured of getting standard American machine tools promptly, British and other foreign manufacturers buy those they can secure as soon as ordered. If such substitute tools work well, they will naturally order similar tools when they require more, which means permanently lost trade for the American tool maker.

"Every machine tool-making industry in the United Kingdom is reported to be overhauling its patterns and bringing them up to date; in short, the British tool makers are Americanizing their tools. One large firm, by copying American machine tools, is reported to have made half a million dollars in 1905, and its business is said to have so increased this year as to indicate a profit of half again as much. Several firms have quadrupled their plants in the last four or five years. This process of Americanizing models applies not only to the Midland counties but to Lancashire, Yorkshire, to the northeast of England, and to Scotland as well.

"No British machine tools, so I am informed, are as yet so good as the American, and the latter are still the best in the world, although the British tool makers are materially improving their products and more nearly approaching the best American models. British machine tools are now from 10 to 25 per cent cheaper than the American, and are said to last as long. Whether the higher cost of raw materials and the demand of British machinists for higher wages will force British tool makers to raise their prices we can not say.

"British machine tools are not so accurate as the American tools. However, where extreme accuracy is not needed the English tool, which now has all the adaptability of the American, is said to be practically as good. If the British manufacturer desires accurate lead screws, within very fine limits, and requires very accurately generated bevel gearing, he must obtain them from the United States. As an indication of the effect of the American manufacturers' inability to deliver machine tools within a reasonable time, I am told that an agent for such American machines recently lost one order for them involving an expenditure of $16,000, as well as several other good orders."

Receivers for National Wire.—The National Wire Corporation, New Haven, Conn., has been placed in the hands of receivers at the request of the National Steel & Wire Co., Portland, Me., which is the holding company. The allegation is made that the New Haven concern is more than $2,000,000 in debt. The company has recently been operating to only half its capacity. The balance sheet of Nov. 26 shows assets of $9,625,379 and a small surplus. The temporary receivers are Henry L. Hotchkiss, of New Haven, and Homer Wise, of New York, the latter being president of the holding company.

The United States Cast Iron Pipe & Foundry Co. has commenced suit at Trenton, N. J., against Andrew H. McNeal, formerly president and chief stockholder of the McNeal Pipe & Foundry Co., of Burlington. The claim is made that he violated an agreement made at the time his company was taken over, under the terms of which he was not to engage in any similar business for a period of ten years from March 16, 1899. The charge is made that he with his associates formed the Standard Cast Iron Pipe & Foundry Co. in violation of this agreement.

BETHLEHEM ERECTING SHOP.

The Bethlehem Steel Co. will build the pumps for the sewerage pumping plant at Baltimore in the new erecting shop which has just been completed at the South Bethlehem plant. This shop is expressly equipped for the manufacture of the heaviest types of machinery, the limits of transportation being the limits as to size and weight. No stock types will be made, the entire attention being devoted to high-class order work of the most exacting description. The building is 122 by 350 feet, three stories high, and of brick and exceptionally heavy skeleton steel construction. The middle bay is 50 feet wide and 60 feet high, extending to the third floor, and is used for the erection of the largest units. The second floor consists of two side galleries 36 feet above the ground floor. Electric traveling cranes serve all parts of the building.

FOR RAPID FREIGHT.

The Ohio Shippers' Association, with headquarters at Columbus, proposes to take an active part in the agitation started by the shippers of Virginia for a more rapid freight movement. Data will be gathered to show the actual speed of shipment. An effort is being made by shippers of Virginia, Ohio and other states to secure the enactment of a national law which will empower the interstate commerce commission to fix a time limit on all interstate shipments. The idea is to have this conform with the length of haul, with a certain percentage of discount from freight bills for every 24 hours' delay beyond the time limit. West Virginia shippers are agitating the passage of a law, creating a railroad commission similar to that now existing in Ohio.

Bessie Furnace Plans.—It is announced at the joint offices of the Columbus & Hocking Coal & Iron Co. and the Bessie Ferro-Silicon Co., Columbus, O., that when the new power plant of the former company, that is being erected at Greendale, is completed, it will furnish power for lighting the furnace of the latter company at New Straitsville. The power plant is expected to be in operation early in the spring. A number of improvements will be put in at the Bessie furnace in the spring in the way of slag handling and conveying machinery. Officials of the furnace company say business was never better and the outlook for the coming year is very bright.

GOOD FELLOWSHIP

And Business Discussions at Anniversary of Rogers, Brown & Co.

Cincinnati, Dec. 22.—The twenty-sixth anniversary of Rogers, Brown & Co., was celebrated by the organization in this city Dec. 18, 19 and 20. The seven partners of the firm held their annual meeting on the 18th and the rest of the organization, including the heads of the officers of the company at New York, Boston, Cincinnati, St. Louis, Chicago, Cleveland, Buffalo, Pittsburg, Philadelphia and Birmingham, met on Wednesday the 19th. After an informal reception of the visiting members of the organization at the offices of the company, a luncheon at the Queen City Club was given. This occasion was largely social in its character, but some of the addresses made were of a business nature.

One of the features of the luncheon was the opening of a trunk by Mr Fowler, who has just returned from a trip abroad. In the trunk was a gift of a humorous nature for each one present. One of the most striking was the gift for Mr. Rogers, a miniature lake ore carrier with the name "W. A. Rogers" inscribed on its side. The luncheon occupied most of the afternoon. The program was as follows:

Welcome .....W. A. Rogers
"What! do we meet together?"
"Ay, and I think one business doth command us."
Shakespeare "Timon of Athens" III-4.

Response .....Noah H. Swayne 2d
To conclude with that stirring incentive to greater zeal, "Drill Ye Tarriers, Drill."
"Talk what you will of taste, my friend, you'll find
That all of us are of a single mind.
Afar we come and yet afar we go
Thrice thanks accept for what you here bestow."
—Pope.

The Art of Selling.....W. T. Shepard
"A good story nebbah w'ars out 'less yo' tell hit twice in de same comp'ny."—*Old Chocolate.*

"Is Everybody Happy?.....M. C. Armour
"'Twixt Optimist and Pessimist
The difference is droll—
The Optimist the doughnut sees
The Pessimist the hole.
—Confessions of a Baker.

"Letter from a Furnaceman to his Salesmen" to be read by H. B. B. Yergason
"Never ask a truthful man for his honest opinion unless you are prepared for a shock."
—Ananias.

"Do you Believe in Furnaces?"..J. K. Pollock
"A Big Man went up to Detroit
Leased a furnace—the same to exploit
Now he sits at his ease
Cutting coupons like cheese
As he says 'I'm the first one that saw it.'"
—Tennyson.

Coke Whys and Ways.....F. W. Miller
"To those who know thee not, no words can paint!
And those who know thee, know all words are faint."
—More.

Southern Conditions .....C. A. Stillman and other Tales of Woe.
"Now here is a verse that's as true as its terse,
And it sizes things up to the letter
No condition's so bad that it couldn't be worse
Nor so good that it couldn't be better."
—The Booster.

"I WILL" speak even if I am from.....
Chicago .....E. L. Billingslea
"Where there's a will there's an inheritance tax."
—W. J. Bryan.
"Prosperity and Automobiles"..D. B. Meacham
"All work and no play is a violation of the eight hour law."
—Gompers.

English and Scotch, Don't cheer know..
.....A. A. Fowler.

"There are some of us travel to Europe and back
On a quest for the novel and new
And the stuff we bring home will find ready sale
If the market is up and production goes stale
The price will surprise you and make you turn pale
But you buy it, you have to, you do.
—The Siren's Song.

QUESTIONS AND REMARKS.

The best thing for any one to say who has nothing to say, is to say nothing and stick to it.

Entertained by Mr. Meacham.

In the evening of the same day (Wednesday) the entire organization was entertained at the home of Mr. D. B. Meacham in Avondale. One of the features of this occasion was a song book, the work of Mr. H. B. B. Yergason which was passed around. The singing was led by the Rogers, Brown & Co. Glee Club. The verses were parodies on some of the popular songs of the day with appropriate reference to each one of those present.

Thursday morning was devoted to discussion of business affairs, concluding with a luncheon at the Business Men's Club.

The occasion was one greatly enjoyed by all present and much good was the result by affording an opportunity for personal contact and acquaintance.

The local branch of the company will give the entire office force a luncheon at the Business Men's Club on the Thursday following Christmas.

Those in attendance:

W. A. Rogers, M. C. Armour, W. T. Shepard, D. B. Meacham A. A. Fowler, E. L. Billingslea, J. K. Pollock, G. R. Sullivan, S. W. Hubbard, Harwood Wilson, Jas. R. Darragh, H. W. Fernald, J. C. Mears, F. W. Bauer, C. A. Stillman, F. I. Foote, F. C. Wright, H. E. Frazier, E. McBirney, H. E. Turner, W. D. Patton, Geo. W. Douglas, A. J. Wentworth, H. B. B. Yergason, R. D. Meacham, T. A. Wilson, Ralph W. Clark, Noah H. Swayne 2nd, F. F. Newcomb, Geo. Rea, E. A. Hummell, J. G. Hancock, William Sampson, A. O. Galloway, S. B. Lyman, F. W. Miller.

Considerable interest has been aroused in Pennsylvania by the applications for charters for the Harwood Electric Power Co., and the Harwood Electrical Transmission Co. The applicants are the Pardees and other well known operators and their power company charter calls for a plant to be built near Hazelton, Pa., while the Transmission company is designed to cover Luzerne, Lehigh, Columbia, Berks, Carbon, Schuylkill and other counties in the anthracite field. It is believed to be the beginning of a huge electric plant to furnish power for mines.

MINERAL PRODUCTION OF THE UNITED STATES FOR 1905.

The total value of the mineral production in the United States in 1905 amounted to $1,623,877,127, being an increase over 1904 of over $260,000,000, according to a statement issued Dec. 23 by the geological survey.

The value of iron in 1905 was $382,450,000. During the same period there was a total production of over 300,000,000 short tons of coal with a value of $467,796,763. Of this amount, there was produced 77,659,850 tons of anthracite coal, valued at $141,879,000; of bituminous coal, 315,259,491 tons valued at $334,877,963. The value of fuels amounted to $602,477,217.

The coke production amounted to 32,231,129 short tons, valued at $72,476,196.

The total production of iron ore in 1905 amounted to 42,526,133 long tons, valued at $75,165,604; pig iron, 22,992,380 long tons, valued at $382,450,000; manganese, 4,118 long tons, valued at $36,214; gold, 4,265,742 ounces, valued at $88,180,711; silver, 101,730,000 ounces, valued at $34,221,972; copper, 901,907,843 pounds, valued at $139,795,716; lead, 302,000 short tons, valued at $28,690,000; zinc, 203,849 short tons, valued at $24,054,182 and platinum 318 ounces, valued at $5,320.

WILL TAP SALISBURY MINES.

Contracts have been awarded by the Salisbury Steel & Iron Co., Utica, N. Y., for building a standard gauge railroad from Dolgeville, N. Y., the present railroad terminal, to the iron mines of the company at Salisbury, Herkimer Co., N. Y. The new road will be about five miles long, and will give the Salisbury company direct connection at Dolgeville with the New York Central railroad. The stockholders of the Salisbury company recently authorized the issuance of $250,000 in 10-year six per cent bonds to defray the cost of the railroad, and to erect a modern 500-ton concentrating plant for treating the milling ore from the company's properties. It now owns outright 1,600 acres of mineral lands, on which the principal outcropping of magnetic iron ore can be traced for 8,000 feet on the surface. It is expected the concentrating plant and the railroad will both be in operation by June 1, 1907.

Patterns Duty Free. — Wooden models or pattern for parts of printing presses have been held duty free by a recent decision of the supreme court.

PERSONALS.

Charles Seybold, president of the Seybold Machine Co., Dayton, O., has returned from a European trip.

M. A. King has been elected to the directorate of the Pressed Steel Pole Co., of Scottdale, Pa., and G. E. Mullin has been chosen treasurer.

J. W. Duntley, president of the Chicago Pneumatic Tool Co., has returned from a six weeks' tour of England, Scotland, Germany and Italy.

John Howard Alexander is now concrete engineer of the General Fire Proofing Co., Youngstown, O. He was formerly engineer with the Hamilton Bridge Co., Hamilton, Ont.

E. J. Cutting has resigned as secretary of the Morgan Spring Co., Worcester, Mass., to establish himself at Seattle, Wash., where he will engage in the drug manufacturing business.

O. A. Stranahan, sales manager for the Allis-Chalmers Co., has resigned. The office has been abolished. Mr. Stranahan has not yet definitely decided upon his plans for the future.

Frank J. Hearne, president of the Colorado Fuel & Iron Co., has purchased a magnificent home at Grant and Sixteenth avenues, Denver, from Col. William E. Hughes, the consideration being $100,000.

Robert S. Riley, of Worcester, Mass., has been made treasurer of the American Ship Windlass Co., Providence, R. I., having acquired the major portion of the holdings of Frank S. Manton, who, however, will continue as president.

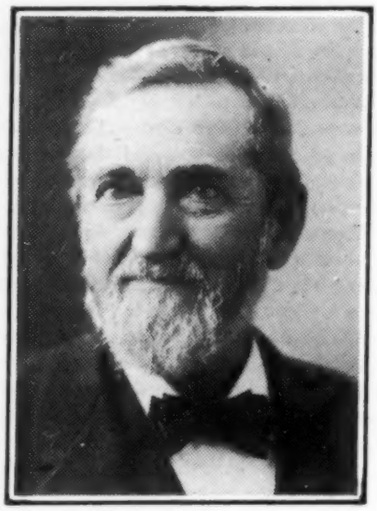
E. C. Sattley, manager of the Page Woven Wire Fence Co., has been chosen second vice president of the Pittsburg Traffic Club. L. H. Constans, traffic manager of the Pittsburg Steel Co., and L. C. Bihler, traffic manager of the Carnegie Steel Co., have been elected to the industrial board of governors.

ADVANCE IN FREIGHT RATES ON PIG IRON.

It has been announced that effective Jan. 1 freight rates on pig iron will be advanced from Virginia points to Central Freight Association territory 25 cents per ton. From the south rates to Ohio river crossings will be advanced 25 cents per ton effective Feb. 1. This advance also includes the western termini of the trunk lines, Pittsburg, etc. The roads north of the Ohio river will advance rates from Ohio river crossings to Chicago and points based thereon 20 cents, Milwaukee 20 cents, Detroit 20 cents, and Indianapolis 15 cents per ton effective Feb. 1.

DEATH OF JOHN S. SLAGLE.

John S. Slagle, for a half century prominently connected with the iron and steel industry of the Pittsburg district, died Dec. 21, after a long illness. He was born Jan. 12, 1828, in Washington, Pa., the son of a well-known jurist. About the middle of the century the family removed to Pittsburg and in 1863 Mr. Slagle was admitted to partnership in the James Shoenberger Iron Co. In 1869 he became identified with Coleman, Rahm & Co., iron manufacturers, and remained with this company until it sold out to the Allegheny Valley railroad in 1872, when he took an interest in the Alexander Nimick Iron Co. When this concern was dissolved in 1893 he opened a commission brokerage office and remained in that business until his death.



JOHN S. SLAGLE.

OBITUARY.

Patrick J. Flaherty, superintendent of the brass foundry of William A. Hardy & Sons Co., Fitchburg, Mass., died Dec. 16 at the age of 38.

George W. Remington, president of the Remington Machine Co., Wilmington, Del., died Dec. 12 at the age of 67. He leaves a widow and two daughters.

Robert Vierling, president of the Vierling, McDowell Co., Chicago, structural fabricators, etc., died at his home Thursday after an illness of several weeks.

Samuel T. Bleyer, founder and former president of the Hawley Down Draft Furnace Co., Chicago, died Wednesday, December 19, after a long illness. The body was taken to St. Louis for burial.

Solomon Finley, until a short time ago secretary of the Howard Iron Works, Buffalo, died Dec. 17 at his home in that city. He was born in 1839 and for 47 years was connected with the Howard Works.

The death of Mr. J. D. Ellis, the chairman of John Brown & Co., Ltd., S. Shiffield, removes one of England's famous captains of industry in the iron trade. He was a native of Birmingham, and educated at King Edward's school.

John Sellers Jr., member of the firm of William Sellers & Co., Inc., Philadelphia, a director of the Midvale Steel Co. and president of the Millbourne Mills Co., died at his home in Millbourne, Pa., Dec. 15, aged 86 years. He was one of the founders of the Union League of Philadelphia.

James Thomas, president of the Davies & Thomas Co., Catasauqua, Pa., died Dec. 18, at the age of 75. He was general manager of the Irondale & Eureka Iron Co., in Alabama in the early seventies, being identified with the manufacture of the first coke iron in that section. He became connected with the Davies & Thomas foundry in 1879.

Wallace Clyde Johnson, a prominent civil engineer, died at his home in Niagara Falls, Dec. 15. He was for some years consulting engineer for the Niagara Falls Power & Mfg. Co., and planned the development of notable power works in various parts of the country, among them the Albion Power Co., the Empire State Power Co. on Schoharie creek and the Bodwell Power Co. in Oldtown, Me.

John C. Wallace, a well known iron and steel manufacturer, died December 24, at his home in Pittsburg. He was born in Ireland, coming to this country at an early date and locating at Pittsburg. In about 1878 he formed a partnership with John C. Kirkpatrick and erected a mill at Leechburg for the manufacture of sheet iron, by a special process. Subsequently the firm built a tin plate mill at Irondale, which was operated under the name of the Wallace-Banfield Co., until its absorption by the Steel Corporation in 1900.

Ore Through the Soo.—The iron ore movement through the canal at Sault Ste. Marie for the season was 35,357,042 tons, an increase of 4,024,405 tons, or 13 per cent over the previous season. Of this total 32,453,645 tons went through the United States canal. This canal was opened April 13 and closed Dec. 17, giving it a season of 249 days. The Canadian canal was opened April 14 and closed Dec. 22, the season being 253 days.

Unique Experiment in Technical Education.[1]

Co-operative Plan of the University of Cincinnati.

The University of Cincinnati is an institution designed to meet the needs of the municipal community. Its position among educational institutions is unique in that it is supported in part by direct taxation. The authorities of this university are, therefore, confronted with a different problem from that usually met by educators; for they hold that the university of a municipality should be an institution by, of, and for all the people of the city, not merely an institution in a city for a few select scholars,—that it should not be a thing apart from the life of the municipality, but, on the contrary, should be a part of the living organism,—the brain—of the body politic.

Holding this conception of a city university, each department of our institution is planned to come into close relationship with the life and industries of the people. In its College for Teachers, for example, the work is planned not merely for those persons who intend to enter into the teaching profession, but also for those already engaged in this field. The same idea is now being carried out in the chemical, electrical and mechanical departments of the engineering college, by an actual working co-operation with the various industries of the city. The plan is at present in successful operation and possesses some phases entirely new in industrial education, the principal one being the close co-ordination of theory and practice.

The Co-operative Course.

The students under this system work alternate weeks in the shops of the city and at the university. In mechanical engineering, for instance, the student works one week at the shop, the next at the university, and so on, his course in the shop being the regular apprentice course of every young man who intends to become a machinist. The course is six years in length, during which time all the subjects taught in the regular four-year course are given in an intensified form. At the end of the course the degree of mechanical, chemical or electrical engineer is conferred, as the case may be.

In order that the machines in the shops may not be idle during every alternate week, the students work in pairs, the two men of a pair alternating with each other at the shops and at the university, one being at the shop while the other is at the university.

Scholastic Preparation Required.

It should be distinctly understood that these students must have for entrance to the course all the educational preparation required for entrance into the best engineering schools, and that they receive as thorough a literary, scientific and mathematical training as the students in the best engineering courses.

GROUP OF BUILDINGS, UNIVERSITY OF CINCINNATI.
Showing the Class of Institution which is Taking up the Problem of Co-operative Education.

It has been found that the young men entering this course are principally graduates of high schools who desire to take a theoretical and practical course, and who also desire to have the financial assistance which their pay as apprentices will give them. In some cases, however, young men of the proper scholastic qualifications have been appointed from the shops, after having served several years of apprenticeship; and in one or two cases men who have reached the grade of machinist, and who are now in the drawing rooms of industrial plants, are working on this basis at the university.

The high school graduates who desire to enter the course, are required to begin work in the shops in June and to work during the summer preceding their entrance into the college. It will be seen that this requirement makes at once a sifting process whereby those men who have not the necessary stamina to continue the work are eliminated before the college work commences, and that it further gives the young man an opportunity to judge whether or not he is in a congenial occupation.

The Course in Operation.

This plan, so far as the university is concerned, began on the 23rd of last September, and at this writing has been in operation for a period of eight weeks. The class started with thirty young men who had been working all of the past summer in the shops. About forty-five prospective students started in June and before the opening of college fifteen withdrew for various reasons, leaving a residue which could be relied upon to finish the course.

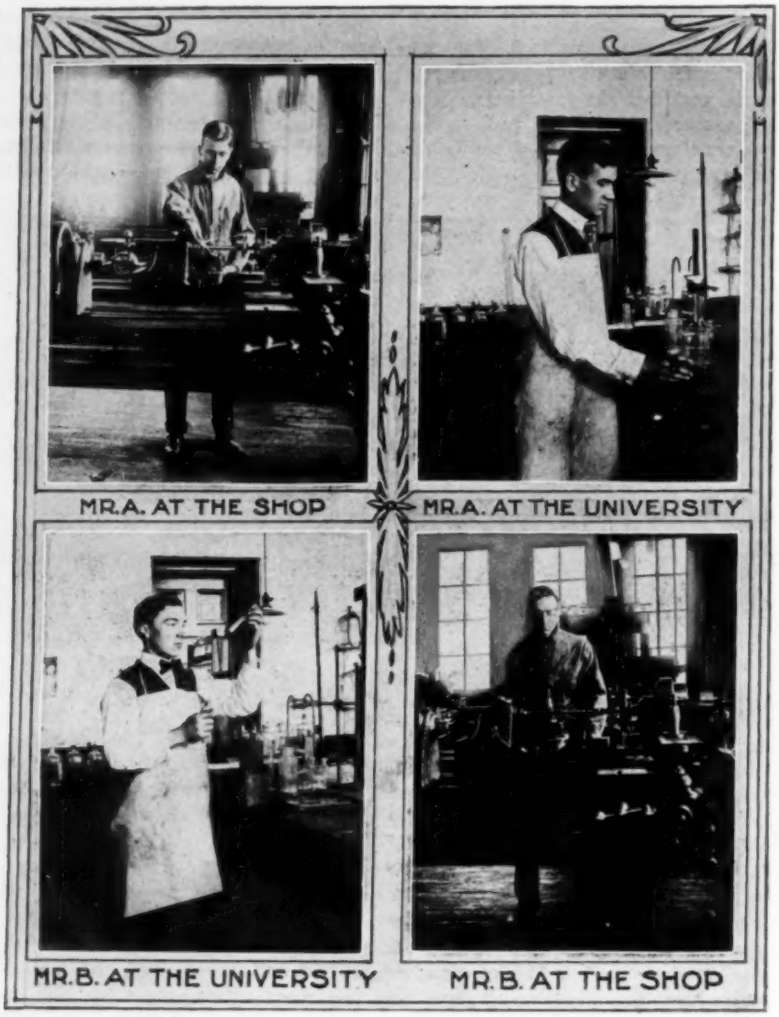
Of the forty-five who began the course in June, about fifteen were country boys, not one of whom has quit since he entered the shops. All of the defections from the class during the summer were by city boys. This fact is mentioned as an interesting and instructive phase in the development of this new system.

When this co-operation was contemplated, a great many doubts were expressed as to its feasibility. It was said, for instance, that the student working alternate weeks at the shop would return to the shop on Monday morning after having been at the university one week, slightly impaired in skill because of the week's absence; and that the student coming to the university after a week's work in the shop would have forgotten much of the work taught him during his former period at the university. It was

[1]By Herman Schneider, Dean of the College of Engineering, University of Cincinnati.

further contended that these young men would not do their best in either place, since their attendance in one place was for short and broken periods of time.

The course has been in operation a sufficient length of time to dispel all of these doubts. A careful canvass of the co-operating plants indicates that these men do as much work as, and in many cases more work than, the regular apprentices. In nearly every instance the manufacturer has stated that his student apprentices are the best apprentices he has ever had.



A "Pair" of Co-operative Students.

Showing the plan of operation, one being at the shop, while the other is at the university.

At the university the work is so designed that the young man is kept in touch with his past work by a series of problems which he is required to solve during his week at the shop, and every Monday morning upon his appearance at the university he is given a short examination on his previous work.

One of the hopeful signs of the system is to be found in the manner in which the co-operative student goes about his work, as compared with the customary manner of the regular four-year student; for it is a well known fact among educators, that the average student usually works along the lines of least resistance, evading, to a certain extent, certain difficult features of his studies. The co-operative student, on the contrary, has learned in his shop experience that the proper thing to do when he receives an order is to do the thing; consequently, when he is given a problem at the university he goes to his desk and solves that problem by his own individual efforts. This is, in fact, the most promising development from the educational side.

The students in the co-operative course are taught by the same instructors as the students in the four-year course. The average scholastic grade of the co-operative students has been found to be about 15 per cent higher than the average grade of the four-year class. This is, of course, to be expected, for the co-operative students may be assumed to be more in earnest about their work than the regular students, since they are willing to go through the shop drudgery in order to get a more thorough education.

A Practical Study of Men.

The greatest advantage by far to the co-operative student arises from the fact that he is working almost continuously with all sorts and conditions of men, from the laborer and the "handy-man" to the superintendent and general manager. It is to be expected that during this period of time he will learn a great deal about the mental attitude of the laborer toward the employer, and about the position assumed by labor organizations toward the problem of production, to say nothing of the knowledge which he will obtain of the petty tricks, rivalries and jealousies which go to make up the social life of the average shop. Of all this the four-year student is practically ignorant when he leaves college, and it has been the constant complaint of employers that college graduates are in no wise equipped to deal with that phase of shop management which concerns the employe.

The Scope of the Practical Work.

It is not intended, of course, that any student shall remain in one shop during the whole of his co-operative course, for during his summer work he will be transferred to foundries and forge shops to obtain an insight into the methods of production in these very important branches of his art. Already a series of lectures by practical men has been begun for these students, explaining in detail the reasons why things are done as they are in shops. The course which is now being given by Mr. Wessling, of the Bullock Electric Co., has to do with foundry practice and the elements of metallurgy. This will be followed by courses on details of machine design, shop management, shop accounting, shop organization, etc., the talks in every case being given by men who are known to be highly skilled in their special lines of production.

The University Work.

The theoretical work at the university is precisely the same as that given to the four-year students, except that the longer time and the alternate week system offer a greater elasticity to the student in the fifth and sixth years, whereby he may choose, to a certain extent, from a certain number of optional subjects. In doing this he will

consult with his employer and his professor, so that the best results may be obtained.

It is planned, also, that in connection with the actual work in the business department of the shops, which he will enter during the latter years, he will receive practical talks from business men on business methods, together with lectures on business law, which will be given by the professors of the university law school. In his latter years at the university he will also be given a course which will bring to his attention the history of the relations between capital and labor, and the economic laws relating thereto, together with a general course on economics, treating of the problems of industrial development.

Expenses.

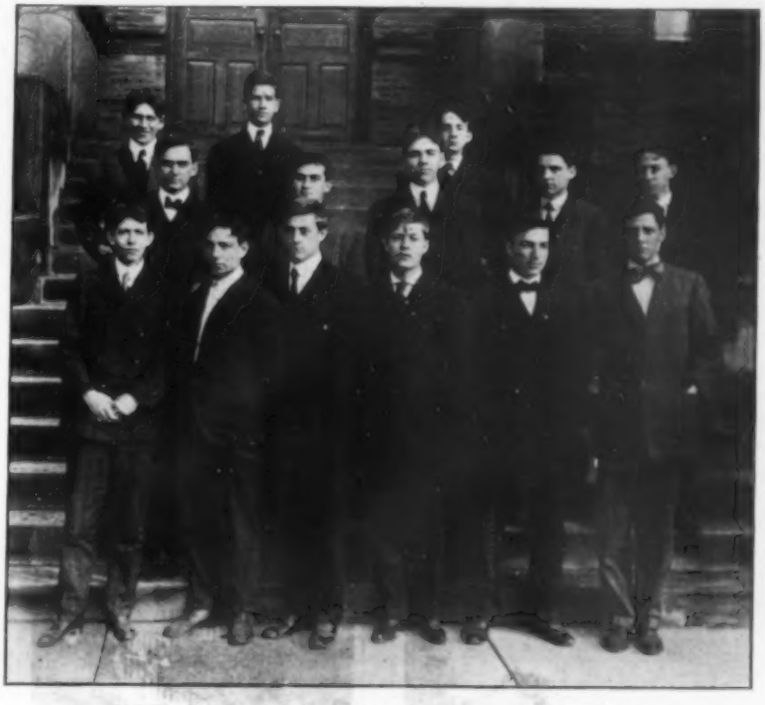
The strictly scholastic expenses amount to about $90.00 for the first year, $80.00 for the second year, and $60.00 for each subsequent year. The university has no dormitory system, unfortunately, and students are required to find boarding places in the city. Board and lodging for the average student cost about $4.50 per week. The wages paid by the manufacturers are not uniform. The lowest wage is $4.40 per week for every week worked, increasing at the rate of 60 cents per week every six months until the course is finished, at which time the young man receives a bonus of $100. Some of the shops start their students at $1.00 per day and have agreed to increase at a rate warranted by their industry and efficiency. In several cases shop owners are paying their young men for the week they are at the university. It is hoped that this question of remuneration will be standardized as far as may be possible before the course has proceeded much farther.

Prospects of the Course.

At this writing the success of the work seems assured, and it is felt by the university authorities that they have brought the university into closer touch with the manufacturing industries of the city. Applications for entrance into next year's class are constantly being received, and the size of the class will depend solely upon the number of men which the shops and the university can take. It will probably be limited to 100 or 125 students. Applications amounting to one-fourth of this number have already been received, and it is probable that about 175 will be sent to the shops next June, of whom 125 will probably begin the course in September.

Benefits of the Manual Work.

Many interesting incidents have occurred, showing the various phases of the beneficial side of this training to the students. In one case a slight young man applied to the writer for a position in the course. His appearance indicated that he was in very poor health, and on examination he confessed that he was not strong, had been very sickly for a number of years, and had a very poor appetite. He was sent, not without certain compunctions of conscience, to one of the largest shops of the city, where he was placed in the foundry as an apprentice about the 15th of June. The writer saw him from time to time, and on the 20th of July, when the class was first brought together as an organization, the young man said that he had gained ten pounds in weight, had not been sick one day during the summer, and had a most voracious appetite. He is now as fine a specimen of young manhood as one would care to see, with hardened muscles and a clear color, and this, after a hot summer in a very busy foundry, during which time he has been doing the usual work of a foundry apprentice. In every case the young men have improved greatly in health, and this has solved for us one of the difficulties in scholastic life, namely, proper exercise for the student. The mentality of these men seems to have increased, as might be expected, with their physical building up, and they come to their work with an energy of attack and a keenness of perception which is lacking, as a rule, in the average student.



A "SECTION" OF CO-OPERATIVE ENGINEERING STUDENTS.

These boys come from every walk of life, the classes now including the son of a minister, a tanner, a doctor, a mail carrier, a mill owner, and several sons of mechanics and farmers.

A Better Engineer.

It is believed that this system of education will furnish to the manufacturer a man highly skilled both in theory and in practice, and free from the defects concerning which so much complaint is made. It is not held, of course, that this method of training will supply full fledged engineers, aged twenty-three years, or thereabouts, but it is believed that it will provide a better preparation, a stronger foundation, for the successful practice of engineering. The qualifications which the engineering graduate should possess will be more nearly attained. He will be just as thoroughly grounded in the fundamental principles of science as he is under present conditions, but he will have greater facility in applying them to practical problems. He will be much more highly specialized but not at the sacrifice of fundamentals. A knowledge of the achievements in other fields of engineering will result from his constant association with the best practice in electrical, mechanical, structural and chemical engineering as exemplified in the construction of the co-operating works, in their methods of power generation and transmission, and in their processes of manufacture,—his attention having been

called to these details in the class room, and his observation of them having been checked by searching questions thereon. He will become familiar with business methods by constant contact with business conditions, supplemented by class room instruction and practical talks on business law. He will obtain a knowledge of men by working intimately with all sorts and conditions of men in his gradual rise through the various departments of the co-operating plants. The cultural part of his education will be planned to make him a man of good address and broad sympathies.

And, finally, a combination of these conditions will teach him to do his best naturally and as a matter of course. It will start him on his life work with a symmetrical and uniform fundamental development of his engineering, his business and his social parts, a development which will continue evenly and make him a skilled engineer, a safe business man, and a broadly tolerant and intelligent citizen.

In a recent letter to the IRON TRADE REVIEW, Professor Schneider says: "Since writing the article I have talked with every man employing our co-operative students, and each one has asked me for a much larger number of these men next year. I have reason to believe that the course will work out successfully, for it is now operating with less friction than my most sanguine hopes had led me to look for."

Among the Cincinnati machine and tool manufacturing firms which have agreed to co-operate in this enterprise are the following:

American Valve & Meter Co.
M. L. Andrews & Co.
Bickford Tool & Drill Co.
Bullock Electric Mfg. Co.
Cincinnati Electrical Tool Co.
Cincinnati Machine Tool Co.
Cincinnati Milling Machine Co.
Cincinnati Planer Co.
Cincinnati Punch & Shear Co.
J. H. Day Co.
Greaves-Klusman & Co.
Hilbert Machine Co.
Hisey-Wolf Machine Co.
Houston, Stanwood & Gamble.
Lane & Bodley Co.
R. K. LeBond Machine Tool Co.
Lodge & Shipley Machine Tool Co.
Lunkenheimer Co.
John H. McGowan Co.
Miller, Dubrul & Peters Mfg. Co.
John B. Morris Foundry Co.
Mueller Machine Tool Co.
National Machine Tool Co.
Oesterlein Machine Co.
Queen City Machine Tool Co.
Smith, Myers & Schnier.
John Steptoe Shaper Co.
U. S. Cast Iron Pipe & Foundry Co.
Watkins Laundry Machinery Co.
Weir Frog Co.
D. T. Williams Valve Co.

CONVERTER STEEL CASTING PRACTICE.—III.

By ARTHUR SIMONSON.

Having considered in the last chapter the calculation of the cupola charge we will now follow its course through the subsequent procedure. In melting steel scrap along with pig iron in a cupola provision must be made for hot melting and a higher ratio than one of coke to seven of iron can scarcely be looked for. Cupola metal containing twenty-five per cent of steel scrap is liable to be sluggish, therefore plenty of coke must be used and an ample amount of blast. It is one of the most necessary things to ensure good hot steel in the converter that the cupola metal should be hot and clean. Some operators use a cupola of sufficient size to tap out

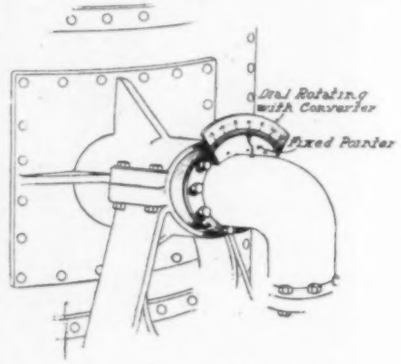


FIG. 1.—TILTING INDICATOR.

the necessary two tons at one time, others prefer a cupola holding only one ton at a time and make two taps per blow. This has its advantages as the iron remaining a shorter time in contact with the bed of coke is less liable to absorb sulphur.

During the time the cupola has been charged and the iron melted the converter has been prepared to receive the first charge of iron. It is necessary to get it to a high heat for this purpose, in fact the hotter it is the better. There are different ways of doing this and perhaps the commonest and most satisfactory is to make a coke fire and blow it with about one pound of pressure from the blower. About two or three hours and half a ton of coke is necessary and the converter is alternately blown for fifteen minutes and turned upside down with a plate fastened over the mouth to retain the coke, and all tuyere box covers removed. This is to heat the bottom, which is not reached by the blast. It is most necessary that the bottom of the converter should be particularly hot. An oil burner or natural gas may be used and is found satisfactory by some users.

When the converter has been thoroughly heated the coke is dumped out into the ash pit and the unburnt portion recovered to be used in drying ladles, etc. The converter should be ready at exactly the same time as the iron is tapped out of the cupola. The iron is collected in a ladle and transferred to the converter, after which the latter is turned down until the iron just comes to the lip. It is then skimmed entirely free from slag and this should be done before commencing each subsequent blow. The vessel is then turned up again and as it rises the operator looks through the tuyeres from the back of the vessel and continues the rotation until the convex edge of the molten metal just appears over the edge of the tuyere. This is the most important point in the manipulation. The metal must be "up," but not in the tuyeres, and what constitutes "up" is a matter that takes some time to learn. It is well to use smoked glasses, or get the eyes accustomed to the color of the metal by watching it whilst being tapped out, poured into the converter and skimmed, otherwise it is comparatively easy to be deceived. When sure that the metal is exactly up, the position of the converter is carefully noted.

For this purpose the writer uses an indicator (as illustrated in Fig. 1) which is simply a quadrant of sheet iron attached to the rotating gland on the trunnion, and a fixed pointer. The indicator is graduated in degrees, both ways from the vertical.

When the converter is in the correct position for blowing, that is for obtaining the best results, the indicator should show about five to nine degrees back from the vertical, that is the tuyeres should be inclined towards the surface of the metal and the direction of the blast should be very slightly downward upon it. Too great an angle would create too great a disturbance of the bath, which the Tropenas process is designed to obviate. If the angle appears too great or too small, a bull ladle of iron should be taken out or added as the case may be. The height of the iron in the ladle may then be noted and thereafter the cupola tender should have no difficulty in tapping out the correct amount.

After getting the proper amount of good hot clean iron in the converter, adjusting and noting the angle, the tuyere box covers are put on and fastened in position. Blast is then turned on by giving the customary signal of two short blasts on the whistle or bell communicating with the blower room, and the mo-

tor should be speeded to give three pounds on the mercury gauge when the byepass valve is entirely closed. (See chapter one for description of operating station or "pulpit.") Take note for record of the exact time of starting the blow.

At the commencement sparks and smoke should come out of the mouth of the converter but very little flame. The sparks should be copious, large and scintillating, and light yellow in color, the smoke noticeable but not too voluminous, and not too dark brown in color. An experienced operator by noting the appearance of the sparks and smoke can tell during the first minute of the blow whether the silicon content is right, and if he is going to have a hot blow or if it will be necessary to doctor it up as it goes along. The sparks should all go up the chimney in parallel lines, not crossing or shooting out at different angles. In from three to five minutes the character of the sparks should change and become non-scintillating and at the same time a flame should appear at the mouth of the converter. This is the time to open the upper tuyeres slightly, as the carbon is commencing to burn and extra oxygen is needed to complete its combustion and reap the full benefit from the heat generated. At the same time the position of the converter should be advanced from two to three degrees, to compensate for the shrinkage in bulk due to the elimination of the impurities.

During the next four or five minutes the flame increases in brightness and volume until what is known as the "boil" occurs. The flame should be carefully watched and if there is a tendency to throw out any metal the blast pressure should be reduced. In extreme cases it may be reduced to one and a half pounds but this is as low as it is advisable to go. There will always be a certain amount of projection of slag, and this is immaterial unless it interferes with the observation of the flame.

Sloppy blows are indicative of incorrect composition of metal, bad position of converter or too much blast. After maintaining its top position for one or two minutes the flame dies down somewhat, and remains in a quiet condition for some minutes. The upper tuyeres may now be fully opened. It then rises again, becomes particularly bright and clear, and finally dies down for the last time with the evolution of copious brown smoke.

The blow should be turned down a few seconds before the brown smoke appears, as this smoke represents burning iron which means waste of metal and ruination to the remainder. The operator throws over his controller, turning down the vessel into the horizontal position, and a second after signals one whistle to the engineer to stop the blower. At this stage there is in the converter a bath of practically pure iron at a temperature well over 3,000 degrees F. Fig. 2 gives the approximate curves of elimination of the elements in a typical blow.

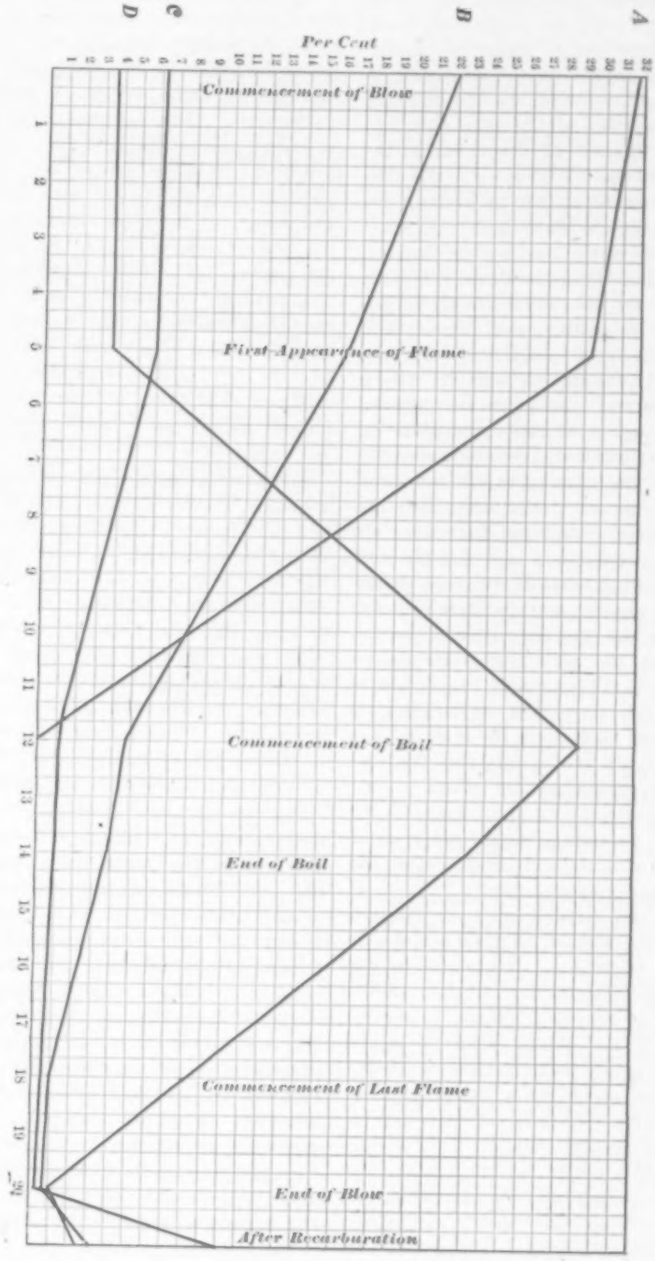


FIG. 2.—CURVES OF ELIMINATION OF ELEMENTS IN A TYPICAL BLOW.
NOTE.—Line A is for graphitic carbon, line B for silicon, line C for manganese and line D for combined carbon.

In order to recarburise it to the desired point a weighed final addition of ferro-manganese, ferro-silicon, silicon-speigel or what not is introduced. This may be added melted, in which case a small cupola or crucible furnace may be used. Or it may be thrown in cold in lumps at the mouth of the converter immediately after turning down the blow, before the slag gets too hard. In this case the lumps must first be dipped in water so that the explosion of the vapor as they strike the hot slag will part it and allow the alloy to go entirely into the bath of metal. This latter way has been found by the writer to be by far the most useful and regular way of adding final additions. A special shaped core for skimming back the slag is fixed in the mouth of the converter and the metal is then ready to be tapped into the ladle. This core is shown in article number one Fig. 3 of this series, issue of Oct. 18.

The above is a description of a perfectly normal blow, which should take place in from fifteen to twenty minutes. Unfortunately all blows are not normal, a great many conditions having to be harmonized to produce that result, some of which occasionally go wrong. Some of the difficulties that arise, with their cause and cure will be touched on briefly. The flame should make its appearance at the mouth of the converter in from three to five minutes. If it comes in less time than that it is a sign that the silicon content of the metal is too low and the probabilities are that the blow will not be as hot as desired, for the silicon is the fuel, and the chief source from which the heat is derived. To offset this, when the flame makes its appearance the converter should be advanced not more than two degrees and about one hundred pounds of ferro-silicon in pig form thrown into the mouth of the converter. This has an astonishing effect and as it melts and gives up its silicon the blow becomes noticeably hotter. If the blow goes on for more than five minutes at the same time the blast pressure remaining the same on the blast gauge, it is a sign that the iron is either too high in silicon or it is too cold. If caused by too high silicon, there may not be very serious results except that the blow will certainly be very sloppy, the loss will be abnormally great, the blow will be longer and the resulting steel may be high in silicon on account of the fact that the carbon burns out before the silicon is entirely eliminated. If the latter is the case there is nothing to do but coax it along and dose it with silicon after the flame makes it appearance.

A frequent trouble due to various causes is the corking of the tuyeres. Its signs are an increase of pressure in the blast gauge without any increase in the speed of the motor, a change in the directions of the sparks, some of which shoot out at all angles instead of all being parallel, and delay in the progress of the reactions. Corking of the tuyeres may cause serious troubles, such as cold blows, and violent reactions. The tuyeres are corked by the formation of nozzles of slag on their extremities which tend to lengthen the tuyeres and may have openings in many directions, dispersing the blast and possibly permitting only a small amount of it to react on the metal. They are caused by cold metal, not setting the position of the vessel correctly, not skimming it clean from slag at the commencement. When this corking is noticed it generally occurs before the flame makes its appearance, and the converter should be turned down, the blast shut off and the projections or nozzles knocked off with an iron bar. The blast is then started and the converter returned to its original position when it will usually proceed all right. It may be necessary to repeat this procedure two or even three times. The result of corked tuyeres is almost invariably a sloppy blow if nothing worse.

In regard to the amount of final addition to be used a good deal could of course be written, also as to the materials to be used. In the first place, let us take the ordinary grades of simple or carbon steel. The analysis to be aimed at varies principally with the use to which the castings are to be put, and secondly to a less extent with the shape and weight of the piece. Speaking from the first standpoint it may be said that the analysis for ordinary machine or engine castings on which a good deal of machining has to be done should be carbon 0.25 to 0.30 per cent, silicon 0.25 to 0.30 per cent, manganese 0.60 to 0.75 per cent, and sulphur and phosphorus as low as possible, under 0.05 per cent.

For castings which will be subject to a greater amount of wear than ordinary, and for those which require a greater tensile strength such as levers, connecting rods and gears the carbon may be raised to from 0.35 to 0.40 per cent, and in cases where the castings are liable to "pull" on account of differences in section, great length, etc., the carbon may be raised to 0.50 per cent, silicon 0.30 per cent, and manganese up to 1.10 per cent. These castings last referred to will need to be annealed in all cases.

For the purpose of recarburising to these points the common materials used are ferro-silicon containing about twelve per cent of silicon, silicon-spiegel containing about ten per cent silicon and twenty per cent manganese, and ferro-manganese containing eighty per cent manganese. The amount to be used can easily be figured by an equation such as was used in section two of this series for calculating cupola charges, but it must be borne in mind that an excess of from twenty to thirty per cent of ferro-manganese must be used to compensate for that which goes to deoxidise the metal, and an excess of about five per cent of the calculated amount of ferro-silicon.

The action of the steel in the ladles is somewhat of an indication of its carbon content to the close observer. The softer and purer the steel the higher is its melting point and therefore in order for it to remain fluid in the ladle and allow it to free itself from gases it needs to be superheated to a higher degree than the harder grades. It is more difficult to "dead melt" soft steel than hard steel and soft castings are more difficult to run and are more liable to blow holes. This is borne out by the fact that gray iron remains fluid in the ladle at a temperature where steel would set.

For making the special or alloy steels such as tungsten steel, chrome steel, manganese steel or nickel steel either the ferro alloys of these elements or the pure products of the electric furnace or aluminothermic process are used, and the amounts vary widely according to the purpose of the castings. The materials produced by the aluminothermic process are very useful on account of their concentration, rendering it necessary to use only the minimum amount to produce the maximum effect, and by the freedom from carbon, etc., making control of the ultimate analysis more simple and certain.

THE HAWTHORNE WORKS.

Under the title of "The Hawthorne Works," a handsome booklet is being distributed by the Western Electric Co., describing its extensive plant at Hawthorne, in the extreme west of Chicago, and illustrating the broad line of power apparatus there manufactured. Aside from their extent, these works are noteworthy because of the facilities afforded for the largest class of work, for the economical design of the shops, for their provisions against fire and coal famines, thus insuring steady work, for their labor-saving methods of handling coal and ashes and for a number of other distinct innovations. The original site of the works was acquired five years ago and has since been largely increased; the plant, as it now stands, has only recently been completed. The foundry is of brick and steel, 176 x 400 feet, divided into three bays, the central one being commanded by two 30-ton cranes. The machine shop is 130 x 860 feet, lighted from both sides and the roofs. Two railway lines cross the works and three terminal roads connect with all trunk lines. A view of the assembling room, contained in the booklet, shows a large 125-volt direct-current generator built there, its capacity being 10,000 amperes, operating at 100 R. P. M.

The Hocking Valley railroad is getting prices on 24 iron and wood working machines for delivery during the coming year. The prices are being asked for at this time so that the appropriations can be made the first of the year. The company is also figuring on the purchase of three 150-horse power boilers to be installed at the Wellston power plant. The new machinery will all be installed at the company's shops in Columbus, replacing machinery that will be sent to the minor shops over the system.

GREAT RECORD OF THE PAST YEAR.

UNPRECEDENTED PROSPERITY OF THE COUNTRY REVIEWED,

With Special Reference to the Chicago District, Where New Capacity, Completed and Authorized, is Tremendous.

By George H. Griffiths.

From every standpoint, 1906 was a most remarkable year. Superlatives are inadequate to express the conditions that have prevailed. In no previous year within the memory of the present business generation has there been such a movement. Prosperity spreads its mantle over the country, and industry has flourished as the green bay tree. To iron and steel makers it has been an especially fast pace though prosperity may seem at its flood tide the grand stand finish is not yet due. Plants groan under the weight of their orders; production records are being broken with an abandon never before dreamed of, but all over the land is still heard a Macedonian cry for more tonnage. The resources of the country are strained to their utmost to meet the unparalleled consumption; millions of dollars have gone into improvements and extensions, and more millions have been set aside for further additions. The wave of prosperity has become irresistible and its force will be felt over the greater part of the coming year.

Causes of Prosperity.

Many causes contributed to this marvelous success in iron and steel during the year under review. The first impetus came from the railroads which commenced adding heavily to their rolling equipment in 1905. The lean years of 1903 and 1904 had been almost destitute of orders of this kind because of the uncertainty that then prevailed regarding the outcome of the presidential election and the possibility of tariff revision. By 1905, the need for more rolling stock had become acute. The country was uniformly prosperous; labor appeared contented and prices were satisfactory. The carrying interests recognized the favorable signs, and that year placed orders for an aggregate of 341,315 freight cars, 3,289 passenger cars, 3,767 interurban cars, and 6,265 locomotives. Of this number, the car and locomotive builders carried over into 1906 for delivery in that year, 175,860 freight cars, 738 passenger cars, 1,575 electric cars and 774 locomotives. It is not expected that the total of orders placed in 1906 will exceed the total figures of 1905, but the race for equipment nevertheless was very keen. In the nine months from January to September, according to responsible authorities, the railroads signed contracts for 218,298 additional freight cars, 1,992 passenger cars, about 1,500 interurban cars, and 4,323 locomotives. There was a noticeable falling off in orders in the last three months of the year, due to the stringency of the money market and the difficulty of floating bonds, and for this reason the figures for 1906 will doubtless fall below those of 1905. The car builders and locomotive plants, however, without exception, were never before so prosperous, and despite the generally increased output, every plant has enough business on its books to insure its operation at maximum capacity for the entire year of 1907. Samuel Spencer, late president of the southern railway, in a speech delivered at Montgomery, Ala., stated that the cost of building a freight car was $800, and of a locomotive from $16,000 to $20,000. On this basis, the value of the freight cars ordered in the nine months ending Sept. 30, including those that were carried over from the year previous, is set at $315,326,400; and of the 5,097 locomotives, from $81,552,000 to $101,940,000. Other authorities, however, place the cost of a freight car and locomotive car at considerably higher figures. The cost of building a passenger car is estimated at $7,000, making the total cost of the 5,805 passenger and interurban cars, $40,635,000. What this unprecedented volume of new equipment means to iron and steel producing interests may be appreciated when it is stated that in an all-steel car of 50 tons' capacity, 22¼ tons of metal are used, and in a box car of 40 tons' capacity, with steel underframes, 16½ tons of iron and steel are used; while in a modern locomotive from 150 tons to 200 tons of iron and steel are used.

The Ship Building Industry.

There is much the same kind of a story to tell regarding ship building activity of the past year. Fifty-six vessels were launched from the ship yards on the great lakes during 1906, 36 of which were bulk or ore freighters, two were car ferries, five were passenger steamers, and the remainder were dredges, small government vessels, fire boats, dump scows and lighters. The value of this fleet is estimated at $20,000,000, and as 80 per cent of the material used is iron and steel, it is easily seen where most of this money has gone. At the commencement of the year, lake ship builders had contracts on their books placed during 1905 for 37 vessels, aggregating 370,000 tons carrying capacity. Today, there are 60 vessels, under order, or in various stages of construction, of an estimated value of $25,000,000. It is more difficult to arrive at any estimate for the calendar year on coast construction, owing to the fact that nearly all the ship yards, and the government records as well, observe a fiscal year. But it is encouraging to state that coast ship yards were never busier than now, except, of course, in the palmy days when the freight of the world was carried in American built clipper ships. Speaking roughly, however, the 1906 construction on the coast consisted of 49 vessels, of a total carrying capacity of 86,000 tons, the approximate value of building which is placed at $28,000,000. The 1907 coast construction, as far as present statistics go, but which will doubtless be added to, consists of 78 merchant vessels, of 159,000 tons carrying capacity and of an estimated value of $40,000,000. The 1907 program of coast construction has never been exceeded in the history of the United States, except in 1855, when the clipper ship was in its glory, and when 583,450 tons were constructed. All these figures have been compiled from official sources, and they carry a significant message to the iron and steel makers of America.

Building Operations.

Building activity during 1906 was on a plane never before equaled. Nineteen hundred and five showed the substantial increase of 40 per cent over 1904, but when the returns for December are in, it is expected that the year 1906 will show a still greater increase. Labor in the building trades never was so constantly employed, money for new construction never was so plentiful, and the weather could not

have been more propitious for the establishment of the highest record of a single year. The number of permits issued during the twelve months from December, 1905, to November 1906, inclusive, from an average of 31 of the principal cities of the country, amounted to 122,823, and represented buildings of the total value of $505,048,554. In Chicago alone, 10,051 permits were issued in this period, the buildings aggregating in value $53,826,830. With the figures in mind of the cost of railroad equipment, vessels and new buildings contracted for during the past year, there is no reason to dispute the statement made by John L. Hamilton, ex-president of the National Bankers' Association, that the manufacturing interests of this country are producing thirteen billion dollars of wealth a year. The above figures do not include the large number of permits taken out during 1905 for buildings completed in 1906.

Labor Troubles.

Compared with former years, 1906 has been remarkably free from labor disturbances in the metal working and kindred lines, another factor which contributed in large measure to the phenomenal results achieved. The principal strikes involved the coal miners, longshoremen, molders and structural workers. Wages were satisfactory, advances having been voluntarily made in almost every line of effort during the past twelve months. The anthracite strike was unimportant in its relation to the iron trade, about the only effects being the banking of a few furnaces and the strengthening of the coke market. But had the longshoremen been successful in tieing up the lake boats as they attempted to do by calling out the mates, a very serious blow would have been delivered to the iron and steel producing interests. Navigation had only just opened, and the winter operations had greatly depleted the reserve ore piles. Prompt action was necessary, and after a few weeks' struggle, victory was won.

The strike of the molders was of greater prominence, and involved between 7,000 and 8,000 skilled mechanics in various parts of the country. This was another attempt to compel the recognition of the closed shop, but, like its predecessors, also proved a signal failure. Wages were too high and steady employment too sure to induce capable men to lay down their tools for the recognition of an indifferent union principle. The structural workers' strike was of short duration, being limited to one or two large cities.

Popularity of the Open-Hearth.

Perhaps the most significant development of the year in iron and steel production is the great extension of the basic open-hearth steel process over the Bessemer steel process. The first impulse towards this change came from the increasing difficulty to secure Bessemer pig iron within the phosphorus limit, due to the increasing cost and growing scarcity of Bessemer ores. It was hastened by the gradual removal of the prejudices against basic open-hearth steel, leading last year to the expression by railroad engineers of a decided preference for rails made from open-hearth steel, which resulted in the placing of orders for about 200,000 tons with the Tennessee Coal, Iron & Railroad Co. Ever since the manufacture of basic open-hearth steel attained important proportions—it passed the million-ton mark in 1897—it has been pushing the Bessemer steel process. In 1905, we made substantially 20,000,000 tons of steel, with nearly 11,000,000 tons of Bessemer, and nearly 9,000,000 tons of open-hearth. But with the completion of the new open-hearth construction authorized the relationship between the two processes will be changed. During 1906, 21 open-hearth furnaces were completed, with an annual capacity of 873,600 tons. There are 47 furnaces now under construction, of an annual capacity of 2,189,360 tons; while 76 open-hearth furnaces are known to have been authorized, with an estimated annual capacity of 4,500,000 tons. The only important Bessemer plant completed in 1906, is that at Youngstown, Ohio, having two 10-ton converters, with an annual capacity of 360,000 tons.

New Blast Furnaces.

Of blast furnaces completed, under construction or authorized during 1906, the total number is 62, with an annual capacity of 7,293,000 tons. These figures do not include the increased capacity provided for by the modernization and enlargement of old plants, in itself furnishing for an increased tonnage of no small proportions.

Chicago has out-distanced all other sections of the country in the amount of new construction undertaken during the year within its confines or contiguous to same. The iron and steel interests of the country have outgrown Pittsburg, and the southern extremity of Lake Michigan has been chosen for the future development of the industry. This district possesses resources more than offsetting the economic advantage of Pittsburg in its proximity to the Connellsville coal fields. Conclusive demonstrations have been made that by-product coke is excellently adapted for blast furnace operations. It is used exclusively in the Zenith furnace at Duluth, as well as in the blast furnaces at Detroit, and has been more or less used in the merchant furnaces in the Chicago district. The by-product coking plants at South Chicago and Milwaukee have been increased during the year to a total of 320 ovens, with an annual capacity of 360,000 tons of foundry and furnace coke. The fact that their entire output for 1907 is already sold testifies to its popularity. The United States Steel Corporation has made provision for a large by-product coking plant at Gary, while a number of eastern capitalists are reported to have recently bought 124 acres of land in Hammond, Ind., with a view to the erection of a mammoth coking plant there. The erection of a plant at Joliet, Ill., for the manufacture of silica fire-brick has removed the only other physical disability towards the development of this district as an iron and steel producing center. Heretofore, all the refractory materials for iron and steel making operations have come from Pennsylvania and Kentucky, but the discovery of a quartzite formation in Wisconsin that can be manufactured into a high-grade refractory that will stand the severe usage of open-hearth practice, not only will make the west independent of the east for this product, but threatens to change the center of operations in this industry. The American Refractories Co., of Joliet, has a capacity of 50,000 brick a day, but when the additions now authorized are completed, this output will be doubled. There is an unlimited supply of the raw material in Wisconsin.

Railroad Facilities.

In railroad communication, the territory to the south of Chicago is unrivaled. Six trunk lines pass through it, and four belt railways connect with it. There is also unlimited room for switching yards and storage tracks, as well as for the expansion of plants and towns located within it. Chicago has long been the foremost iron and steel distributing center of the country, and the manufacturers of these products have not overlooked the time and expense represented in the haulage from Pittsburg that will be saved. It is also nearer to the ore ranges than any of the Lake Erie ports by several hundred miles, and the location of all the blast furnaces at the water's edge, as is the practice at South Chicago and in Lake county, Indiana, will eliminate the great expense involved in trans-shipping the ore from Lake Erie ports to the blast furnaces many miles distant.

New Construction in Chicago District.

The new construction in this district has been reported in THE IRON TRADE REVIEW during the year.

The Gary plant overshadows all other undertakings in this district. In its completed state, it will produce annually, in round figures, 3,000,000 tons of steel. Of this 900,000 tons will be open-hearth rails, 300,000 tons will go into plates, 360,000 tons into merchant bars, and the balance will be divided into structural shapes, billets, etc. There will be four bar mills, one 8-inch, one 10-inch, one 12-inch and one 14-inch, each of 90,000 tons annual capacity. The first unit, of four, 450-ton blast furnaces, 28, 60-ton open-hearth furnaces, together with the blooming and slabbing mills, and other finishing mills necessary to handle the steel produced, has been under construction for several months; the second unit, also of four blast furnaces and 28 open-hearth furnaces, of the same capacity, as well as the finishing mills to accompany same was authorized last month. When these are completed, they will comprise 50 per cent of the total prospective output.

The other additions are summarized briefly, as follows:

Illinois Steel Co., South Chicago.

Completed.

One 500-ton blast furnace.

One furnace rebuilt and put in blast last November, increasing capacity from 100,000 to 150,000 tons a year.

Seven 50-ton open-hearth furnaces.

Under Construction at South Chicago.

One, 30-inch universal plate mill to roll plates from six inches to 30 inches wide to 80 feet long; capacity, 7,500 tons a month.

One 24-inch, light rail mill to roll from 12-pound to 45-pound sections; capacity 7,500 tons a month.

Authorized.

Two 250-ton mixers for the Bessemer department and a new 40,000,000-gallon pumping engine.

Furnaces 1-2 to be rebuilt during coming year, increasing capacity of each stack 50,000 tons a year.

Illinois Steel Co., Joliet.

Completed.

One 500-ton blast furnace.

One track-bolt and nut plant, capacity 20,000 kegs per month.

One splice bar plant for making rail joints of the Continuous and Wolhaupter types; capacity 11,000 tons a month.

Illinois Steel Co., Milwaukee.

Five of the six finishing mills rebuilt, materially increasing their former capacity of 15,000 tons per month.

American Steel & Wire Co., Waukegan.

A new factory authorized for the manufacture of insulating wire and cable.

Inland Steel Co., Indiana Harbor, Ind.

Under Construction and Authorized.

Two 400-ton blast furnaces.

Three 50-ton open-hearth furnaces.

One Morgan continuous bar mill to roll down to ⅜-inch rounds.

Other finishing capacity includes the installation at the steel plant of the International Harvester Co., South Chicago, of a Morgan continuous bar mill consisting of eight stands of 16-inch rolls, three stands of 14-inch rolls, with cooling beds and straightening machines, with a capacity of 6,250 tons a month.

The American Rolling Mill Corporation, Chicago and Munic, Ind., also commenced the erection of a new bar iron plant in Chicago, comprising one 21-inch and one 10-inch mill, with a capacity of 150 tons a day.

A plant is being built at Terre Haute, Ind., for re-rolling old rails, and the year witnessed the completion of the sheet mill at Atlanta, Ind., with a capacity of 1,500 tons a year.

The additions to the merchant furnace capacity during the year include the following stacks now nearing completion.

Federal Furnace, South Chicago, for the Federal Furnace Co., Chicago, two stacks, 18½ x 75 feet. Product, malleable and foundry. Annual capacity, 200,000 tons.

Mayville Furnace B., Mayville, Wis., for the Northwestern Iron Co., Milwaukee, Wis., 17 x 77 feet. Product, foundry iron. Annual capacity, 80,000 tons.

The Iroquois Furnace Co., has not yet commenced the erection of the two furnaces authorized some time ago.

The enormous increase of productive capacity represented in this schedule of extensions, assumes a place of almost secondary consideration when compared with the consuming and fabricating interests it will invite to Chicago. The tide has already set in. The Standard Steel Car Co., of Pittsburg, has decided to locate at Hammond, Ind., and has in course of erection there an immense plant, while the Western Steel Car & Foundry Co., of Chicago, will build a model manufacturing town to be known as Burnham, on the Calumet river, of which its new works will form the nucleus. The Pullman Co. has also decided upon the erection of a new plant at Pullman, for the manufacture of steel and wooden freight cars. Many other manufacturers are also considering location in this district.

The Trend of Prices.

There were noticeably more price changes in 1906 than in 1905. Demand was so active throughout the year and manufacturers' capacity so fully engaged ahead that it was impossible to maintain a schedule for any lengthy period. The acute scarcity of crude steel and the shortage of cars that prevailed during the greater part of the year also militated against uniformity. The large increases to finished capacity undertaken in the previous year had not been equalized in semi-finished lines, and the discrepancy was felt with the first onward rush. The Illinois Steel Co. made several billet purchases in the open market to meet its contract obligations, and was further obliged to buy a round tonnage of Bessemer pig iron because of the shortage entailed by the blowing out of some of its furnaces for relining and other improvements. Several thousand tons of billets were imported from England and Germany by the International Harvester Co. and other local fabricators, but the relief afforded was only temporary. There are no indications that the pressure will be diminished in the first half of 1907, and rolling billets at $29.50 Pittsburg, forging billets at $36 Chicago, and wire rods at $39 Chicago may be minimum prices for months to come. The volume of business on the books of western mills for delivery in the new year is sufficient to insure the continuance of existing conditions for at least half that period. Briefly stated, the Illinois Steel Co. has its entire output of steel rails for 1907—approximately 650,000 tons—under contract. In addition, it has orders on its books for substantially 180,000 tons of steel bars, and 100,000 tons of plates, representing its maximum capacity for the year on bars, and at least two-thirds of its annual output of plates. On structural shapes, light rails, track supplies, etc., it is not so fully sold ahead, but it is nevertheless comfortably fixed on all these materials. Live specifications in the hands of this company today aggregate 300,000 tons; and with the passing of the holiday season these are expected to be materially increased. The Illinois Steel Co. does not stand alone in the extent to which its output is sold ahead. Every manufacturer of iron and steel, large or small, wherever located, is in practically the same position.

Strong Demand for Rails.

The Illinois Steel Co. had its rail output for 1906 delivery sold before the end of midsummer, 1905. Subsequent orders were transferred to Carnegie mills. Buying for 1907 delivery commenced in June last, and within a few weeks after the opening of its books, the company was sold up and diverting tonnage to the other plants of the Steel Corporation. Two million and a half tons is a conservative estimate of the aggregate rail tonnage on the books of manufacturers at the present time. The demand for light rails was of a more scattering na-

ture. There was a greatly increased consumption, however, in this territory during the year, leading to the erection of a new plant at South Chicago with an annual output of 90,000 tons. This will be in operation early in 1907. Standard Bessemer rails remained at $28 f. o. b. mill during the year, and this price was reaffirmed for 1907 requirements. The price for rails made from open-hearth steel, however, has been fixed at $29 mill. Light rails advanced from $31 f. o. b. mill for 12-pound sections, at which they sold in January last, to $37, the price quoted today. Track supplies have also advanced. At the opening of the year, angle bars were quoted at $1.50, spikes, $2, and track bolts, $2.50. Today, for prompt shipment, these products are selling at $2.25 for angle bars; $2.75 to $3 for spikes, and $2.85 to $3 for bolts.

Structural shapes remained at $37.30 a ton, Chicago, during the entire year. Mills were not heavily taxed with specifications in the last half as a result of the completion of a number of new plants which rapidly reduced the undelivered tonnage. From January to November, plates also remained unchanged at $35.30 a ton Chicago. Following an advance in steel bars in October, however, and partly because of the active buying movement for 1907 deliveries which made itself felt in the last quarter of the year, a number of plate manufacturers advanced their schedules $2 a ton in the last week in November. Some independent mills are asking $36 a ton Pittsburg for plates, but the leading manufacturers adhere to the $34 schedule, or $37.30 Chicago. There was one advance in boiler tubes of one point to $2, and three advances were made in merchant pipe. The latter occurred on Oct. 12 Dec. 4 and Dec. 20, and amounted to $4 a ton, $2 a ton and $2 a ton, respectively. Steel pipe is now quoted at 78 per cent discount, Pittsburg, on the base sizes, ¾ to 6 inches; it opened the year at 81. Wire nails remained on the basis of $2 Chicago to jobbers from January to November. There was some shading of this price in the summer months, but it vanished entirely with the advent of fall. In November an advance of $1 a ton was made, and this was followed by another advance of $2 a ton in December. The market is now $2.15 per 100 pounds Chicago. There has not been in the annals of the trade so tremendous a demand for wire materials as was felt in the past six months. Every pound that is made goes into immediate consumption, but mills are steadily falling behind in deliveries.

The Pig Iron Market.

There was but one attempt to control the price of southern pig iron during the year. This was made in May. In that month, the leading Birmingham producers, together with several Tennessee furnaces, entered into an agreement to maintain the $14 basis. The association failed in its effort, however, and after brief existence, it was dissolved, the market thereupon declining to the lowest point of the year.

Two distinct price movements were apparent in pig iron during the twelve months under review. The first six were marked by vacillation on the part of buyers of foundry irons and a wavering attitude by producers. On the other hand, steel making irons were very scarce, and high prices were paid for prompt shipments, especially in the first half. Both the Illinois Steel Co. and the International Harvester Co. were buyers of Bessemer pig in the open market, while the American Steel Foundries imported several thousand tons from England. In foundry irons, the year opened strong with northern No. 2 selling $19.25 Chicago, and southern No. 2 at $14.50 Birmingham. February saw the first signs of weakness, the market declining 50 cents a ton in that month. Following this drop, prices rose and fell for the next four months, according to the changing conditions of the market. The lowest price of the year on the southern iron in this market was obtained by the International Harvester Co. on its purchase of 25,000 tons in July. This iron was divided into two grades, 50 per cent to contain from two per cent to 2.50 per cent silicon, and 50 per cent from 2.50 per cent to three per cent silicon. The price at which it was reported sold ranged between $12.90 and $13.50 Birmingham. For the general run of business, however, $13 Birmingham was the lowest price of the year. This obtained in June after the dissolution of the Southern Furnace Association. The lowest price paid for northern No. 2 foundry was doubtless $17.85 Chicago, which was quoted in the same month that southern iron touched bottom. The competition of valley and Ohio furnaces in the first half of the year was the main cause of the weakness in local foundry irons. With the strengthening of the Cleveland market, the furnaces in that district became filled up and withdrew from this market. Local prices immediately afterward advanced. There is no parallel in the amount of buying that followed. The car shortage in the south that prevailed during the greater part of this period was accentuated by the labor scarcity in that region, both aiding in withholding shipments that were urgently needed. In the north, the transfer of furnaces from the manufacture of foundry irons to steel making irons, still further emphasized the need of greater merchant productivity to meet the growing needs of this community. The situation did not improve with time and delinquent tonnage accumulated on furnace books at an alarming rate. Foundrymen were forced to reenter the market with supplementary contracts. Iron for immediate shipment was the popular cry. With the increasing demand prices advanced rapidly. No quotation was allowed to stand over night, and it was not unusual for prices to advance two or three times during the course of a day. All attempts at uniformity were abandoned, and there were as many schedules in force as there were sellers. Today, spot iron is held at $23, Birmingham, or $26.90 Chicago, for southern No. 2 foundry, and at $27 Chicago for northern No. 2 foundry. Separate schedules also exist for deliveries in the first, second, third and fourth quarters of 1907, for which the buying has been quite active in the last three months. The new year starts with practically all furnaces in the north and south, sold up for the first half, and with very large tonnages on their books for the last six months.

Large importations of English and Scotch irons were made during the year, especially by consumers along or contiguous to the Atlantic seaboard. In the west, the International Harvester Co. was the principal buyer of the foreign product. Between 15,000 and 20,000 tons have been ordered by this interest, all of which will be delivered in the next two months. It is not likely that further purchases will be made, as not only will ocean and railroad freight rates advance the first of the year, but the British pig iron market has also advanced. Furthermore, the domestic situation is gradually improving, and with the blowing in of several new furnaces, which is expected at an early date, the congestion will be relieved.

Sulphur in the Cupola.—In the article on "Foundry Mixtures" by Bradley Stoughton, published in THE IRON TRADE REVIEW on Nov. 15, an error occurs on page 27 under the heading "Sulphur and Manganese." It is stated "that iron takes up about 0.35 per cent of sulphur in the cupola." This should be 0.035.

IRON MINES YIELD MAXIMUM OUTPUT IN 1906.

MESABI RANGE DEVELOPMENT RESPONSIBLE.

Exploration of Idle Properties a Feature on Old Ranges—Labor Shortage a Constant Obstacle.

BY OLIVER J. ABELL.

In decided contrast to the season of 1905, the iron ranges have enjoyed during this year an unusual amount of splendid weather for mining. The influence of the elements is felt mostly, of course, on the Mesabi range where so much stripping for open pit mining is carried on. Last year the pits were continually flooded and dumps were a mass of unstable mud. Operations were carried on either intermittently or with the greatest difficulty while this season there has been scarcely any delay on the surface. The year has been one notable in several instances aside from the fact which was forecasted early in the year that the total shipments, as approximately determined from early reports, show an increase of 4,036,685 tons over last year exclusive of "all rail" shipments which will probably be about the same as in 1905, when they aggregated 876,552 tons. The source of the increase in this truly remarkable lake shipment of 1906 is traceable directly to the Minnesota ranges, where a total of 25,632,867 tons have been mined, as compared with 21,705,804 tons last year. These comparative figures indicate clearly that almost the entire gain has been made on the Mesabi range, for the Vermillion range increased its shipments by but 115,166 tons. Of the other ranges, the Marquette, Gogebic and Menominee, no one made substantial gains, and in any case not sufficient to counterbalance the decrease in the amount of ore handled at Escanaba, the shipping port of the Menominee and part of the Marquette ranges. The activity as regards ore shipments from the Baraboo and Michipicoten ranges did not differ from that in 1905 and again this year no shipments were made from the Cuyuna range in the Deerwood district or the Atikokan range on the Canadian shore of Lake Superior.

The Vermillion Range.

The Vermillion range is not a region of great changes and the past year has not been greatly different from those preceding. Attention may be called, however, to the splendid record of the Pioneer mine, which continues to ship at an increasing rate, mining practically all of the increase for the entire range during the past season, and what is more gratifying still, the ore body of this splendidly laid out mine shows no indication of its limits. The Zenith mine is developing nicely, and will in the matter of size probably take the place of the Chandler, which is commonly accepted as having passed the greatest point of its career. The noteworthy event during the year on the Vermillion was the disposal of a part of the holdings of the Shagawa Iron Co. in section 30 to the Northland Ore Co., the mining branch of the Midland Steel Co. This will bring into mining activity an exploration which has been as famous as the range itself. In addition to this, considerable exploratory work has been undertaken partly on former explorations and partly in new fields, particularly in the latter case on Pine island in Vermillion lake where the Biwabic Mining Co. is investigating quite thoroughly. The work of the White Iron Lake Co. south of Ely has likewise commanded considerable attention, though there is a degree of difference of opinion as to the value of the deposits which they are working upon, the common opinion being that they have a quantity of magnetic ore. However, little is known beyond the statements of the company itself, and there is no positive reason for not anticipating a considerable development at that location. At the Soudan mine, a considerable amount of work has been done in shaft sinking to explore the deeper deposits, and it is more than possible that 1907 will find the confines of the Soudan deposits largely increased. Exploration on the Vermillion range is both difficult and problematical and therefore investigation has been much discouraged.

Great Activity of the Mesabi.

A resume of operations on the Mesabi range during the past season would be a continued recital of tremendous activity and unusual accomplishments. The great event of the year, almost too prominent to need mention again, was the transfer of the iron bearing lands held by the Great Northern and Northern Pacific railways, together with the holdings of the Pillsbury-Bennett-Longyear interests to the Oliver Iron Mining Co. of the United States Steel Corporation. As the result of this acquisition, the Oliver Iron Mining Co. has increased its holdings of Mesabi range mining lands, on the basis of estimated reserves about 10 to 15 per cent. This increase, however, does not add, in a noticeable degree, to the commanding position that this company has occupied in Minnesota for a number of years in the past, and the only apparent result of the transaction will be the assurance of a careful and farsighted use and conservation of the ore reserves of that district. The direct influence upon other buyers and consumers of iron ore is a constriction of supply by the taking out of the market of a large number of properties from which in the past sections have been sold and which, had they not been disposed of, would probably have been acquired by independent interests in the future.

The Wonderful Hibbing District.

With the exception of that tremendous producer, the Mountain Iron mine, where this year 2,541,785 tons were taken out of the pit, the greatest amount of ore was shipped, as in 1905, from the wonderful district around Hibbing. Of the total shipments from the Mesabi range over half came from the mines in that district. Among the shippers there one only needs to recall the Stevenson, Mahoning, Burt, Morris and Hull-Rust, all of which produced considerably over a million tons to realize the reason for the tremendous output of approximately 13,000,000 tons. A year ago the Morris pit broke all records in the matter of first year production by shipping slightly over a million tons, but this year the Hull-Rust pit may be looked upon with even greater admiration, not so much because it has shipped this year a greater amount 1,690,202 tons, as because its future points to one of the most remarkable open pits on the range. The Hull-Rust ore body adjoins that of the Mahoning, the two pits opening into one another, being the beginning of what definite plans have already outlined to be a tremendous excavation that will extend over an area of several square miles, including the townsite of Hibbing

More here, perhaps than elsewhere has been plain the committing of mining men to open pit mining rather than underground work, where the obstacles are anything short of prohibitive. The depths of overburden amounting to 100 feet and taconite capping heretofore considered as entirely beyond the scope of steam shovel stripping, no longer stand in the way of open pit work.

Important Excavations.

On the western end of the range, marked advances have been made in the plans for handling the ore of that section which work has been but recently described in these columns as having distinctive features. The eastern end of the Mesabi range has during 1906 come into prominence much more distinctly than ever before as the result of the large amount of exploration in that territory with its attendant favorable results. All of the mines east of Biwabic are comparatively new, the property of the Corrigan-McKinney Co. at Aurora, the Meadow and Fowler properties, which are Jones & Laughlin and the St. Clair interests, the Adriatic and the Kellogg are all essentially this year's operations. Between Biwabic and McKinley also some ore bodies have been defined and just now the Oliver Iron Mining Co. is preparing for shipments from the McKinley property, which occupies territory covering eight forties. In the group of mines east of Sparta and around it, the Genoa is being extended and the Gilbert, a body of excellent ore, is being opened up. The central portion of the range, including the mines at Eveleth, Virginia, Mountain Iron and Buhl have been very active. Some properties, new and old, have been opened up there including a part of the Adams, Fayal and Commodore, which has been changed from underground to milling pit, Wacoutah, Brunt and Grant. To this latter mine, which is a property of the Jones & Laughlin Steel Co, a large amount of attention has been drawn because of the unique stripping apparatus installed there. This apparatus will be described, to some extent, at a later time, and for this review it will be enough to say that from the standpoint of the operating company, the grab has worked successfully in its first year, for it is admittedly in an experimental state. A great many delays have occurred during the summer and considerably less than 100,000 yards of stripping have been removed, although it was expected at one time to make the Grant a shipper in 1906. A novelty in the manner of sinking shafts through quicksand is being undertaken at the Bangor and Syracuse mines, where the methods used in sinking for submarine foundations are being applied.

The Chisholm district has been extremely active, the operations involving particularly the opening up of the new Hartley property and the active mining of the Monroe-Tener, where last year practically nothing but preparatory work was done. New shafts have also been sunk at the Clark and the Glen mines, and at the end of 1906, this section may be considered as the most promising and important group of underground properties on the range.

New Mesabi Mines.

The list of mines which have entered the shipping list from Minnesota during the season just closed include the following: Adriatic, Hobart, Victoria (resumed), Tesora, Wacoutah, Nassau, Hull-Rust and St. Paul. The mines on the Mesabi not operating at the beginning of 1906, or idle for the first time this year were the Auburn, Columbia, Franklin, Union, Frantz, Longyear, St. Clair, Sparta, Scranton, Sauntry, Sharon, Wills and Penobscot. The Stephens mine, which shipped in 1905 367,764 tons, did not ship at all this year, the work there being entirely confined to stripping. At the Ajax mine, the old Kanawha, some exploratory work was done, but little ore shipped. The following is a partial list of the mines with their approximate shipments for the season:

Mountain Iron	2,541,785
Missabe Mountain	5,674
Higgins	114,199
Chemung	227,120
Burt-Pool	1,376,874
Chisholm	397,156
Clark	274,394
Glen	279,424
Morris	1,809,743
Hull	282,592
Rust	284,626
Hull-Rust, open pit	1,690,202
Myers	228,451
Pillsbury	33,545
Sellers	241,031
Monroe-Tener	512,988
Winifred	3,415
Iroquois	190,971
Lincoln	367,192
Troy	146,849
Shenango	383,717
Minnesota	146,502
Chandler	318,990
Pioneer	766,853
Zenith	181,580
Savoy	106,932
Sibley	271,495
Fayal	1,634,541
Genoa	179,467
Ajax	9,056
Adams	1,238,349
Spruce	674,601
Mohawk	92,715
Hector	37,220
Elba	255,571
Corsica	100,606
Sparta	234
Malta	115,762
Minorca	151,530
Cass	60,512
Mayas	107,244
Bessemer	131,790
Union	20,691
Franklin	66,934
Pettit	82,756
La Belle	50,466
Miller	234,070
Biwabik	807,374
Duluth	158,336
Holland	95,472
Victoria	64,819
Adriatic	3,294
Tesora	12,001
Cincinnati	1,373

The remaining mines including the Hawkins, LaRue, Crosby, Leetonia, Stevenson, St. Paul, Alexander, Cyprus, Mahoning, Agnew, Utica, Nassau, Albany, Laura, Pearce, Croxton, Webb, Morrow, Leonard, Jordon, Kinney and Yates had an aggregate shipment of 6,084,464 tons.

The Marquette Range.

On the Marquette range, development has been in the nature of extending the present properties and improving them rather than the opening up of new mines.

A number of the old properties, particularly the American, idle since 1895, were looked over by various interests during the year, preparatory to again including them in the shipping list. The principal operator in this district continues a uniform policy of progression and has met with gratifying results in its work on the Cascade range. The Maas mine, for so long a time an exploration, at the end of 1906 is practically ready for mining. The new docks at Escanaba and Marquette though improving conditions largely, failed to increase shipments in any great degree. Both the Steel Corporation and the Cleveland Cliffs Iron Co. added largely to their equipment during the year, and it is noticeably true that the mining situation is better in Marquette county at the end of 1906 than at the beginning.

The Menominee district has been the scene of unusually active exploration. Crystal Falls, Iron River and Stambaugh Valley have been looked over in every direction with varying success. The broken and uncertain nature of the formation on this range has been in part responsible. In actual mining, the Chapin again looms up in the foreground with a shipment of about 950,000 tons, completing a record for two decades of nearly 15,000,000 tons. Other large shippers including the Aragon, Bristol, Florence and Pewabic have maintained their ac-

tivity. The Caspian mine, which has been developing slowly up to this year, has assumed proportions of much greater magnitude in 1906 and is looked upon to have a good record in store.

As in the Marquette district, exploration has not confined itself to new properties, but some of the old mines have been gone over with the resulting probable restoration of temporary idle mines. A small amount of open pit work is being done, the milling system being used in a few instances, and in one case at the Munro mine a steam shovel proposition was undertaken this year.

New Features on the Gogebic.

On the Gogebic range, the year has witnessed many things of interest. A number of new and old properties are being explored, particularly, at the western end of the range where the Oliver Iron Mining Co. is sinking a shaft at the Atlantic and Plummer properties and the Montreal Mining Co. is exploring the Mellon and Tylers Forks lands. The prevalence of steel shafts and shaft houses has become much more marked with the operations of 1906, and 1907 will see new shafts of this kind which were begun this year at the Montreal, Norrie group, Pabst, Newport, Eureka and Asteroid. Operations at two of the mines where the shafts have been carried down to the greatest depth have shown that the range offers splendid possibilities in the matter of large deposits of good quality of ore at a depth to which most of the shafts have not been sunk as yet. This prospect has led to plans on the part of the Steel Corporation for a similar development of its mines, and surface equipment adapted to these larger operations is being installed. The past year has added largely to the horizon of this range's future, and it is confidently expected that many of the difficulties encountered in the more superficial formations will not be met at depths of 2,000 feet where the ore body seems to widen out and be freer from intercepting dikes. Shipments from the Gogebic have been slightly in excess of those last year, and only scarcity of labor has prevented the shipping of much larger quantities. However, the grade of ore for which the Gogebic has been so famed is somewhat less fine in quality than heretofore, though, in a number of instances, it is expected a deeper exploration will bring a return to former grades of iron.

Progress with Cuyuna Range.

The Cuyuna range has made more progress in the last twelve months toward a time when ore will be shipped from that section than in any previous years. It is pretty definitely understood, at this time, that there is a large quantity of ore running into the millions of tons of a certain grade which averages in the neighborhood of 45 per cent of iron, and with a phosphorus content which, though varying between wide limits, is uniformly high. This year's exploration, however, has shown that there are some bodies, not amounting individually to more than 1,000,000 tons of ore, that are marketable so far as quality is concerned, at the present time. However, railroad rates and facilities, at this time, are prohibitory. As in 1905, there is but one shaft sunk, that belonging to Pickands, Mather & Co. The Oliver Iron Mining Co. has drilled in three portions of that territory, having had eight drills southeast of Brainard and two more just south of Rabbit lake, up until late in the season. At that time, it was understood that, though in the northern exploration a fair quality of iron was discovered, it was the intention to withdraw the drills as had previously been done in one of the sections south of Deerwood. There can be no reasonable doubt that this range will be in time a source of considerable ore.

False Reports Circulated.

The Atikokan range has practically undergone no change during the past season, the only development work being the one exploration conducted by the Hunter interest. An examination of the territory late in the year brought forth the opinion that the condition of development could not possibly permit of shipment within a year, even though it were so desired. No great amount of general exploring has been done, though it is understood that the United States Steel Corporation knows about what the possibilities of the range are. Considerable attention has been directed in the past few weeks to the deposits of ore near Port Arthur on the northeast shore of Lake Superior. While numerous reports have placed the quantity of ore there in the hundreds of millions of tons and the quality as high-grade Bessemer, that condition of affairs is scarcely to be credited. It has long been understood that there was a considerable quantity of ore there of a certain grade, and more or less exploratory work has been done there. The truth of the present reports probably is that systematic development of such iron as is there is to be undertaken and if there is sufficient foundation to warrant it, that region will undoubtedly be one of considerable activity, for it would then present a loop hole through which a number of consuming interests can escape from a present too confined supply of ore, and it may be expected that that field will assume a commercial aspect in the near future.

In the Baraboo district of Wisconsin, this season has seen a number of the independent explorers withdraw from their search for iron there and simultaneously has been witnessed the taking up of the exploration by the Oliver Iron Mining Co., which is practically the only operator now in the field. As in 1905, the only producing mines were the Illinois and Iron Ridge.

Labor Difficulties.

On all the ranges, it has been a common source of inconvenience to maintain a supply of labor compatible with the amount of worked planned. In some places, this scarcity has amounted to a real want and in all localities, it has meant the application of considerable ingenuity in keeping up with the rate of shipping that has brought about the tremendous total for the year. The Mesabi range has felt the labor situation less keenly, perhaps, than the lower ranges where, in some places underground, when ore was blocked out preparatory to shipping a certain quantity of ore per month, less than one-third of that schedule could actually be accomplished.

Looking to the Future.

At the end of the season, two correlated events are particularly significant: The increase in the price of ore established for 1907 indicates a maximum tension between demand and supply and the decrease in the iron guarantee has recognized the gradual lowering of the quality of iron shipped. This latter fact must not be taken altogether to mean a decreasing supply of the high-grade ores formerly available, but is to be understood as resulting in part from the lower average grade, caused by the increasing percentage of lower grade ores that go to make up the largely increased total shipments. The season of 1906 may be looked upon as marking a point in our inroads upon the ore resources where we have passed from the beginning stage of extraction with no idea of the end to a place where, while the end is by no means in sight, the plan of operations leading to it has been more or less outlined.

Dull and Irregular Market in Stocks.

The stock market of the past week was generally irregular and comparatively dull, with a downward tendency which resulted in small losses on almost every security dealt in. The bulk of trading, as for some time past, was in railway securities, although Amalgamated Copper and steel common were at no time dull. The market opened in a weak condition and some eased perceptibly and banks were able to gain considerable in cash. The annual report of the Southern Pacific showed a gross gain of $10,117,000 and a net gain of $5,660,000, common stock earnings being 8.3 per cent against 4 per cent the previous year.

The Crucible Steel Co. of America reports for the quarter ending Nov. 30, as follows: Net earnings, less repairs, in-

& Bolt Fastener Co., regular quarterly, 5 per cent with an extra dividend of 10 per cent, payable Dec. 20; Standard Coupler Co., regular semi-annual 4 per cent, on preferred and 2 per cent on common, payable Dec. 24; Westinghouse Electric & Mfg. Co., regular quarterly, 2½ per cent on preferred and the assenting and non-assenting stocks, payable Jan. 10; Central Coal & Coke Co., regu-

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation Dec. 15	Closing Quo. Dec. 21	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Pay.
Allis-Chalmers Co.	17	17¼	+ ¼	Sept.	100	19,820,000			
Allis-Chalmers preferred	44¼	43¾	− ½		100	16,150,000	7 cum	.....	Feb., 1904
American Can	6¼	5⅞	− ⅜	Apr. 24	100	41,233,300			
American Can preferred	54½	54	− ½		100	41,233,300	7 cum	5 Q.	Oct., 1906
American Car and Foundry	43¾	42⅝	−1⅛	June 28	100	30,000,000		½ Q.	Jan., 1907
AmericanCar and Foundry preferred	101	100¾	− ¾		100	30,000,000	2 n. c.	2 Q.	Jan. 1907
American Locomotive	73	73		Oct. 16	100	25,000,000		1¼	Feb., 1907
American Locomotive preferred	110½	111	+ ½		100	24,100,000	7 cum	2 Q.	Jan., 1907
American Shipbuilding	77	75	−2	Oct. 2	100	7,600,000	4 n. c.	1 Q.	Dec. 1906
American Shipbuilding preferred	110	109	−1		100	7,900,000	7 n. c.	1¾ Q.	Nov. 1906
American Steel Foundries	10⅝	10	− ⅝	Oct. 3	100	17 700,000			
American Steel Foundries preferred	46¾	45½	−1¼		100	17,700,000	6 cum	.....	Aug., 1905
Barney & Smith	70	70	.....	June 5	100	1,000,000	4	4	Dec., 1906
Barney & Smith preferred	139	139	.....		100	2,500,000	8 cum	8 Q.	Dec. 1906
Bethlehem Steel	18	18¾	+ ¾	April 3	100	15,000,000		.....	
Bethlehem Steel preferred	62	60	−2		100	15,000,000	7 n. c.	3 Q.	Nov., 1906
Bullock Electric preferred	112	112	.....	Oct. 2	100	1,000,000	6	6 Q.	Oct., 1906
Cambria Steel	37⅞	37¼	− ⅝	March 20	50	45,000,000	6	3 Q.	Aug., 1906
Cambria Iron	47½	47½	.....		50	8,468,000	4	4 S. A.	Oct., 1906
Colorado Fuel & Iron	56¾	55¾	− ¼	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	15	15	.....	May 31	100	6,098,000	5	.....	Nov., 1902
Crucible Steel	12	11¼	− ¾	Oct. 17	100	25,000 000		.....	
Crucible Steel preferred	79	77	−2		100	25,000,000	7 cum	.....	Sept., 1906
Empire Steel	6	6	.....	Feb. 28	100	2,281,400		.....	
Empire Steel preferred	55	50	−5		100	2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	95	95	.....	Feb. 20	100	1,000,000	6	6 Q.	Nov., 1906
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	Nov., 1906
General Electric	160	158½	−1½	May 8	100	48,256,050	8	8 Q.	Jan., 1907
International Pump	41	39	−2	June 5	100	12,262,500		2	July, 1905
International Pump preferred	81¼	81	− ¼		100	8,850,000	6 cum	6 Q.	Nov., 1906
Lackawanna Steel	71	71	.....	March 14	100	34,971,400		.....	
Lake Superior Corporation	15	15	.....	Oct. 3	100	40,000,000		.....	
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	Sept, 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	Dec., 1906
Otis Elevator Co	51	50	−1	March 19	100	6,350,300		2 A.	Apr., 1906
Otis Elevator Co. preferred	96	95	−1		100	5,589,500	6 n. c.	6 Q.	Jan., 1907
Pittsburg Coal Co	16¼	16	− ¼	Feb. 12	100	30,135,000		.....	
Pittsburg Coal preferred	59½	57½	−2		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	54¾	53½	−1¼	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	99¾	99¼	− ½		100	12,500,000	7 n. c.	7 Q.	Nov., 1906
Pullman Palace Car	182	181	−1	Oct. 18	100	74,000,000		8 Q.	Oct., 1906
Railway Steel Spring	54½	52¾	−2	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	99½	97¼	−2¼		100	13,500 000	7 cum	7 Q.	Dec. 1906
Republic Iron & Steel	39½	38½	−1	Oct. 17	100	27,352,000		.....	
Republic Iron & Steel preferred	98¾	97¼	−1½		100	20,852,000	7 cum	7 Q.	Jan., 1907
Sloss-Sheffield	77	75⅝		March 14	100	7,500,000	5	5	Oct., 1906
Sloss-Sheffield preferred	105	105	.....		100	6,700,000	7 n. c.	7 Q.	Jan., 1907
Tennessee Coal & Iron	160½	160	− ½	May 15	100	22,552,800		4 Q.	Nov., 1906
U. S. Cast Iron Pipe & Foundry	45½	45½	.....	June 27	100	12,500,000		?	Dec., 1906
U. S. Cast Iron Pipe & Foundry preferred	86	85¾	− ¼		100	12,500,000	7 n. c.	7	Dec., 1906
U. S. Steel	48⅞	48½	− ⅜	April 16	100	508,302,500	2 n c	½ Q.	Oct., 1906
U. S. Steel preferred	105	103⅞	−1⅛		100	360,281,100	7 cum	7 Q.	Nov., 1906
U. S. Steel 5's	97⅝	97⅝	.....		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	80	80	.....	Sept. 18	100	8,641,600		.....	
Westinghouse Electric	151	151	.....	June 27	50	20,996,350	10	10 Q.	Jan., 190
Westinghouse Air Brake	153	153	+1	Oct. 2	50	10,990,450	30	30 Q.	Jan., 1907

sharp declines were recorded. The latter part of the week, however, saw improved conditions and recovery was general. Steel common was strong during the break, but when the reaction set in, gained slowly, thus exerting a remarkably steady influence. The strength of the issue was principally for buying on London account, together with the recurrence of the report that an advance on the common dividend rate was possible at the January directors' meeting. The money situation continued important throughout the week, but toward the end

terest, charges, etc., $542,344; amount reserved for contingencies, $10,922; balance of net earnings $531,422; preferred dividends $366,548; surplus for the quarter $164,875. The quarterly dividend of 1½ per cent on preferred stock, the same as paid in previous quarter, was declared.

Recent dividend declarations include the following: New York Air Brake, regular quarterly, 2 per cent, payable Jan. 22; American Locomotive Co., regular quarterly, 1¼ per cent on common and 1¾ per cent on preferred; American Nut

lar quarterly, 1½ per cent on common and 1¼ per cent on preferred stock, payable Jan. 15; International Coal & Coke Co., Ltd., 1 per cent, payable Feb. 1; Ashland Iron & Mining Co., regular quarterly, 3½ per cent, payable Dec. 20; American Iron & Steel Mfg. Co., regular quarterly, 1¼ per cent on preferred and 2 per cent on common, payable Jan. 1.

The Colorado Fuel & Iron Co. has applied to the New York stock exchange to list $2,102,500 of additional common stock.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

W. H. Nicholson & Co., Wilkesbarre, Pa., has been incorporated for $100,000 by George Nicholson and others to conduct an iron and steel business.

The Girard Hardware Co., Girard, Pa., has been incorporated with a capital of $10,000 by N. A. Wilson, J. P. Sherman, B. F. and S. G. Easterbrook.

The Federal Furnace Co., Chicago, has increased its capital stock from $600,000 to $800,000.

The Rockford Bolt Co., Rockford, Ill., has been organized with a capitalization of $20,000 by Charles R. Wise, Robert H. Tinker and Ramsey C. Messmer.

The Hermance Machine Co., Williamsport, Pa., has increased its capital stock to $40,000.

The Lonsdale Foundry Co., Knoxville, Tenn., has been incorporated with a capital of $25,000 by J. T. Emmons, J. W. Tillery, M. A. Ammons, W. P. Richards, A. T. Richards, P. E. Tillery and J. M. Brooks.

The Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has increased its capital stock from $175,000 to $840,000.

The Norwalk Steel & Iron Co., Norwalk, O., has been incorporated under Ohio laws for $1,000,000 by A. M. Beattie, James C. Gibbs and others.

The National Foundry & Machine Works, New Haven, Pa., has been organized with a capitalization of $20,000 by D. C. Springer, E. N. Stahl, J. T. Johnson, J. B. Eachard and Francis L. Rocks, of Connellsville, and J. L. Cypher, of New Haven.

The Kemmerer Iron & Steel Co., Scranton, Pa., has increased its capitalization to $100,000.

Joseph G. Hitner and Frederick M. Hitner, of Philadelphia, have asked for a charter for the well-known firm of Henry A. Hitner's Sons.

The San Antonio Machine & Supply Co., San Antonio, Tex., has filed an amendment to its charter, increasing its capital stock from $100,000 to $150,000.

The Stowell Mfg. & Foundry Co., Milwaukee, has increased its capital stock from $200,000 to $300,000.

The Fuller Engineering Co., Allentown, Pa., has increased its capitalization from $5,000 to $155,000.

The Galena Iron Works, Galena, Ill., has increased its capital from $60,000 to $160,000.

George W. Jackson, Inc., has been organized with an authorized capital stock of $3,000,000 to deal in structural material. The directors of the company are: George W. Jackson and T. C. Jackson, of Chicago, and J. B. Russel, of J. B. Russel & Co., 46 Wall street, New York.

The Toledo Nut Lock Co., Toledo, O., has been organized with a capitalization of $60,000 by Edward M. Gale, Benjamin Tanner, Mary C. Smith, Robert B. Wilson and W. E. Brown.

Beaudry & Co., Inc., Boston, has been incorporated to deal in power hammers and machinery. The capital stock is $10,000, and the incorporators are: Alexander Beaudry, 141 Milk street, Boston; Otto Abrahamson, 141 Milk street, Boston, and Charles P. Searle, 50 Congress street, Boston.

The Kern Machine Tool Co., Cincinnati, has been organized with a capital of $50,000 by Philip Fosdick, L. H. Fosdick, W. H. Burtner Jr., C. F. Kern and John F. Clermont.

The Elmira Saw & Machine Co., Elmira, N. Y., has been incorporated to manufacture engines, boilers, machinery, etc. The capital stock of the company is $10,000, and the incorporators are: M. C. Reynolds, William French and others.

The Acme Fdy. Co., Louisville, Ky., has been incorporated for $10,000 by Charles H. Shield, W. J. Stine Jr. and J. R. Bridgeford.

The Canadian Billings & Spencer Co., Ltd., of Brockville, Ont., has been incorporated with a capital of $200,000 to manufacture forgings, tools and machinery; provisional directors, James G. Hardner, James H. Botsford and William S. Buell.

The Percival Plow & Stove Co., Ltd., Merrickville, Ont., has been organized with a capitalization of $200,000; provisional directors, John B. Waddell, George F. McKimm, Edwin W. Stickney, Roger C. Percival and W. R. Morris.

The W. I. Kemp Co., Ltd., of Shatford, Ont., has been incorporated to manufacture agricultural implements; provisional directors, Wesley I. Kemp, Nelson J. Kemp and James S. Lewis.

The Meisel Mfg. Co., Ltd., Port Arthur, Ont., has been organized with a capitalization of $350,000 to manufacture machinery; provisional directors, Frederick W. Woods, Gottleib C. Meisel, Robert McN. Meisel, James Conmee, George Clavet, George F. Horrigan and Alexander J. McComber.

William H. C. Mussen, George Boulter, George G. Foster, Cecil G. McKinnon and William R. Staveley have been incorporated under the laws of Canada as "Mussens Limited" to take over the business of W. H. C. Mussen & Co., manufacturers of machinery and contractors' supplies. The capital stock of the company is $500,000 and the head office will be at Montreal.

New Construction:—

The Standard Pulley Co., Cincinnati, manufacturing pulleys and clutches, has broken ground for a new plant which will triple its present capacity. The foundry will be 100 x 200 feet and the machine shop 50 x 238 feet.

The William E. Gang Co., Cincinnati, manufacturing radial drills, is making improvements and extensions to its factory, which will give it about 3,500 square feet of additional floor space.

The Myers Pump & Mfg. Co., Bliss, Okla., will manufacture pumps and air compressors. Full machine shop and foundry equipment will be required. The company states that Bliss is only a temporary location and that eventually the factory will probably be removed to another city.

The General Railway Signal Co., Rochester, is erecting two large shops, doubling its capacity at that place, and the management contemplates further additions on an extensive scale.

The Cleveland Twist Drill Co., Cleveland, has secured a permit for the erection of a boiler room to cost $25,000 at its plant at Hamilton and East Forty-seventh streets.

The Cleveland Pneumatic Tool Co., Cleveland, is planning to erect a duplicate of its present plant in the spring. This will take the place of a number of improvements planned for the past fall and abandoned because of the lateness of the season.

The Russell & Erwin Mfg. Co., New Britain, Conn., is to erect a seven-story factory building 50 x 60 feet.

The Monarch Tool Co., Stamford, Conn., is negotiating for a site on which a small factory building will be erected.

The Republic Iron & Steel Co. has taken out a permit for the erection of a new office building at the Haselton plant near Youngstown, O.

The Moore Drop Forging Co., Springfield, Mass., which recently lost its plant by fire, is preparing plans for

rebuilding. Considerable new machinery and other equipment will be required. The new structure will probably be of steel.

The Dickson Land & Improvement Co., Dickson, Tenn., is reported as planning the erection of a large blast furnace. Lands owned by the company are largely timber and contain extensive ore deposits.

The Coosa Pipe & Foundry Co. is now occupying the extension to its plant at Gadsden, Ala. The new building is 85 x 125 feet and is arranged for the manufacture of pipe fittings exclusively.

The Northway Motor & Mfg. Co., Detroit, has let the plans through architects Field, Hinchman & Smith, for a factory and machine shop.

The Central Steel Casting Co., Columbus, O., has secured a tract of about a dozen acres in the southern section of that city, where transportation facilities are excellent. Articles of incorporation have been filed, the capitalization being $100,000, and the incorporators are: John L. V. Bonney and W. B. Floyd, both connected with the Jeffrey Mfg. Co.; K. E. Burr, John Rogers and P. B. Monypeny. Plans for the plant are being prepared, the intention being to have a capacity of about 500 tons of castings a month at the start.

The Norwood Engineering Co., Florence, Mass., has begun the erection of a brick and steel addition to its machine room 55 x 100 feet.

The Avoca Wheel Co., Avoca, N. Y., which lost its plant by fire some weeks ago, is to be continued through the organization of a new company. In this Claude D. Carroll, John J. Ellis and H. W. Smith, formerly connected with the plant, will be active. A large new plant will be erected.

The Atlas Drop Forge Co., Lansing, Mich., is to erect a complete plant, and is now placing orders for machinery. Several large hammers are included in the equipment.

The Indiana Foundry Co., Indiana, Pa., will make an addition to its machine shop, doubling its present capacity, and later on will enlarge its foundry.

The American Die & Tool Co., Reading, Pa., which during the past year has more than doubled the capacity of its factory, is now engaged in further extensive alterations, and all necessary requirements have been filled. The company recently changed its incorporation to conform with the laws of Pennsylvania. Stockholders and officers are: H. M. Sternbergh, J. H. Sternbergh, C. S. Dundore and E. S. Smith.

The plant and business of the Philadelphia Pipe Bending Works have been sold to the Philadelphia Pipe Bending Co., Philadelphia, recently incorporated with a capitalization of $50,000. Extensive improvements will be made, for which ample capital is provided.

The Birdsall Engine Co., Auburn, N. Y., has secured the plant known as the Conklin Roller Works, which it is equipping and remodeling for the manufacture of the Birdsall skid, portable and traction engines, special hauling and contractor's engines, etc. The officers of the company are: Emery Caldwell, president; J. C. Weeks, vice president; Henry O'Brien, secretary, and Walter A. Nye, treasurer.

General Industrial Notes:—

The properties of the Woodstock Iron Co., including two blast furnaces at Anniston, Ala., ore mines at Cedartown, Ga., Gadsden and Jenifer, Ala., and coal mines and coke ovens at New Castle, Ala., are to be operated by a new company of which J. M. Barr, of Norfolk, Va., will be the head. Associated with Mr. Barr, who was formerly president of the Seaboard Air Line railroad, will be J. B. Carrington and H. F. DeBardeleben, of Birmingham, and others. The Anniston furnaces will be put in shape for operation at an early date.

The works of the Diamond State Steel Co., Wilmington, were sold at receiver's sale Dec. 18 to John B. Newkirk & Co., of Philadelphia, for $575,000. The purchasers represent a syndicate of stockholders.

The Southern Steel Co.'s blast furnace at Rising Fawn, Ga., has been blown out for repairs and remodeling.

Star furnace, of the Star Furnace Co., Jackson, O., is again in blast after relining.

The Curtis & Neff Screw Co., Ltd., Buffalo, has changed its name to the Curtis Screw Co., with F. O. Curtis as proprietor. Standard set and cap screws are manufactured.

Enoch A. Baker, of Boston, has purchased the business of the Asa Pettingill estate, at East Hartford, Conn. The firm of Asa Pettingill & Son manufactured shears, cutters and punches.

The Bellefontaine Bridge & Iron Co., Bellefontaine, O., was recently victorious in ten suits brought against it on the technical basis that the county auditors of ten counties in which the company had obtained contracts had failed to make certificate that the money was in the treasury at the time the contracts were let.

The Hewitt Mfg. Co., recently incorporated at Milwaukee, succeeds to the business of an unincorporated company which has been in operation for the past five years. No new equipment or change in management is anticipated.

McKEE REVOLVING FURNACE TOP SUCCESSFUL.

The decidedly successful operation of the initial installations of the McKee revolving furnace distributor has resulted in its superseding the former design of blast furnace top on the following furnaces which are now in blast: Four stacks of the American Steel & Wire Co. at Cleveland, three stacks of the Republic Iron & Steel Co. at Birmingham, Ala., one stack of the Southern Steel Co. at Gadsden, Ala., one stack of the Central Iron & Coal Co. at Holt, Ala., one stack of the Penn Iron & Coal Co. at Canal Dover, O., and one stack of the Cherry Valley Iron Co. at Leetonia, O. This device, on which there are patents pending, provides a more even distribution of the charge into the furnace, and was designed by Arthur G. McKee, consulting engineer, Rockefeller building, Cleveland. A number of other furnaces are also adopting this new top, the operation of changing now being in progress.

Acquires Wyland Plant:—The Warren Axe & Tool Co., Warren, Pa., manufacturing axes and logging tools, recently acquired the patents and equipment of the American Drop Forging & Tool Co., Wyland, N. Y., and has moved the plant to Warren. New buildings have been constructed of concrete throughout, and much new machinery has been installed. The company makes a specialty of the American pipe wrench and other patented tools and drop forgings. W. J. Todd is president, H. P. Stone, general manager and treasurer, and D. W. Murphy, superintendent.

W. E. Farrell, treasurer of the new Lebanon Steel Casting Co., recently incorporated, says the company will operate a plant at Lebanon, Pa., where a foundry will be built, the building to be 100 by 60 feet. M. H. Treadwell, of the Treadwell Mfg. Co., Lebanon, and Ralph McCarty, of the Stoever Foundry & Machine Co., Myerstown, are interested.

William A. Whittlesey, Pittsfield, Mass., died suddenly Dec. 5, at the age of 57. He was one of the founders of the Stanley Electric Co., of Pittsfield, which is now a part of the General Electric Co.

IN THIS ISSUE: Unique Experiment in Technical Education.—Annual Industrial Reviews.

THE IRON TRADE REVIEW

A Weekly Journal Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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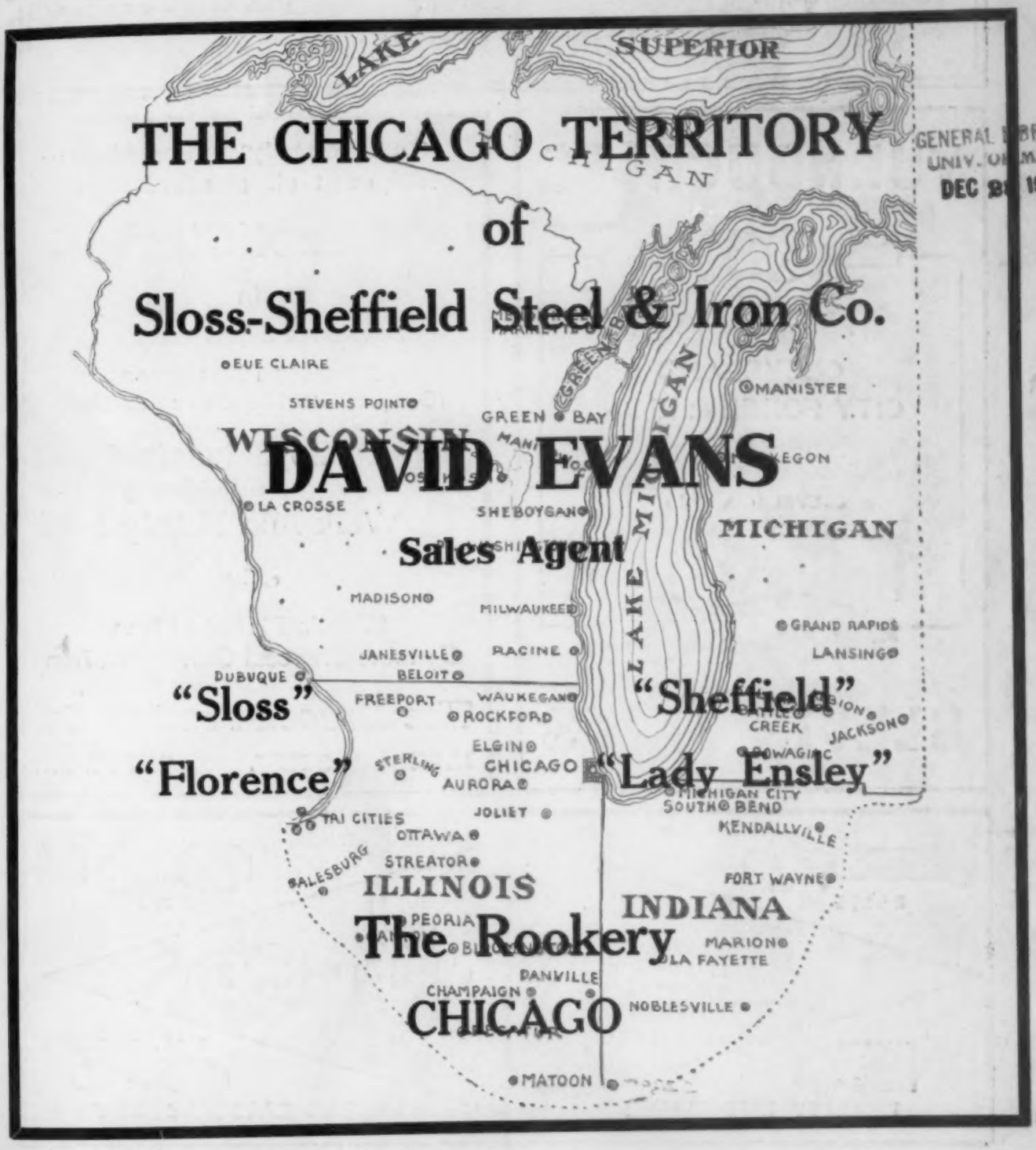

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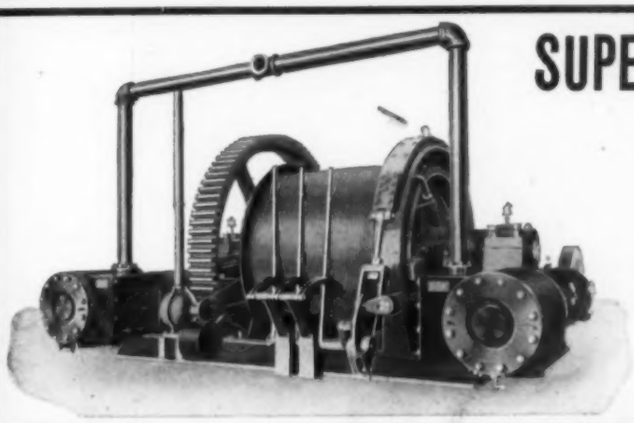

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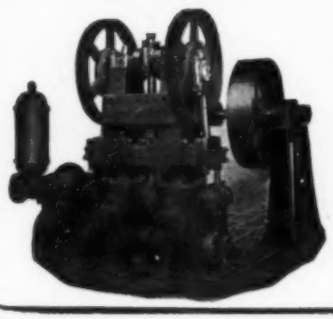

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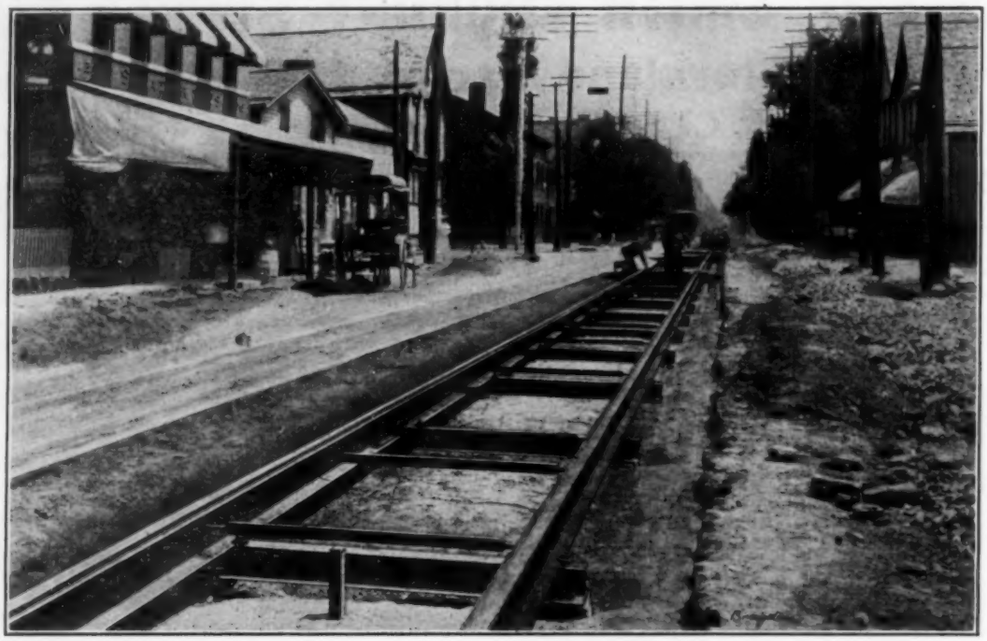

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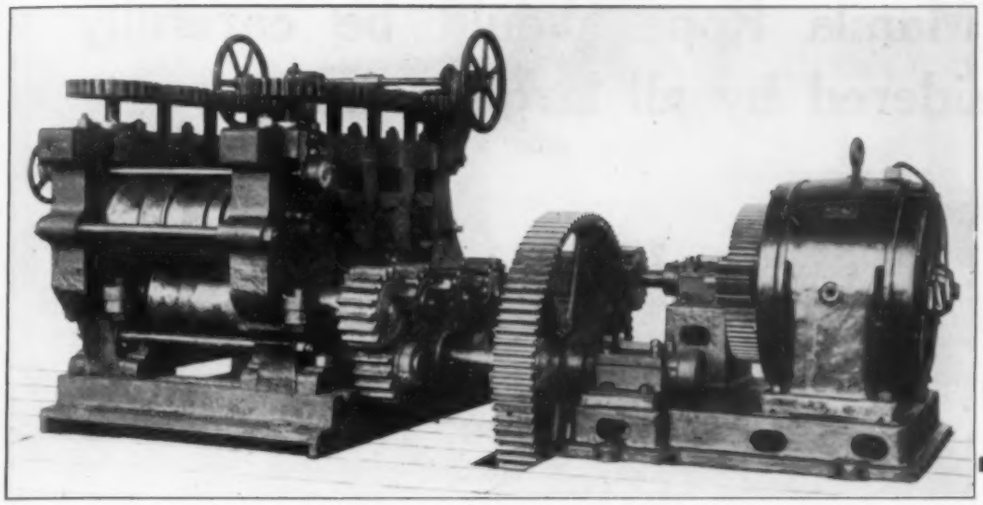

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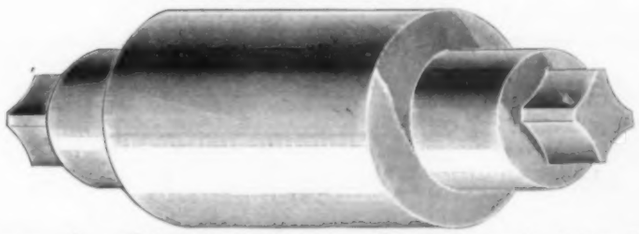

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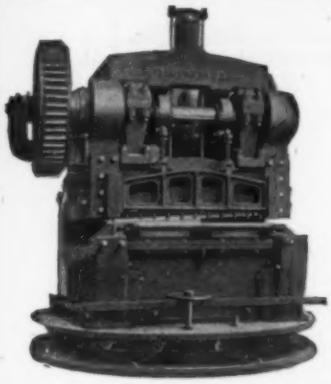

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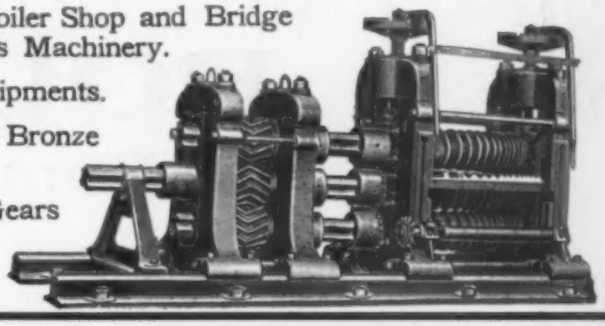

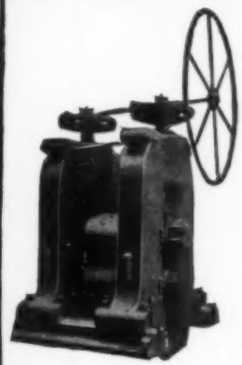

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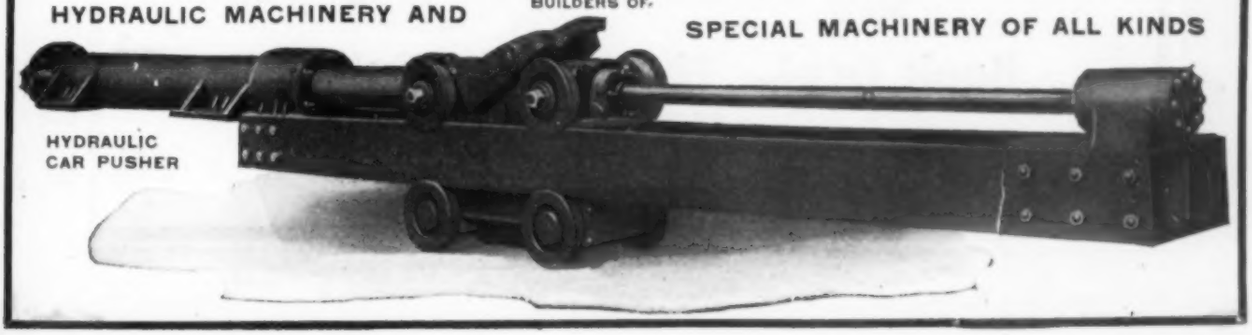

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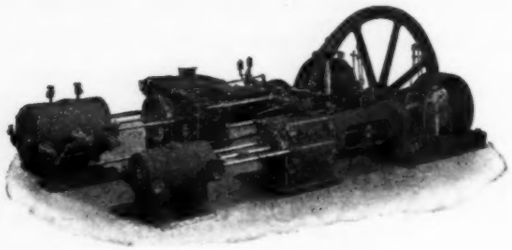

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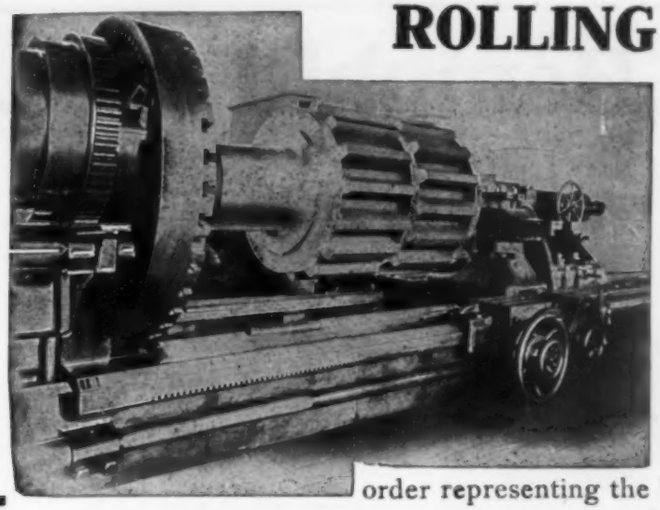

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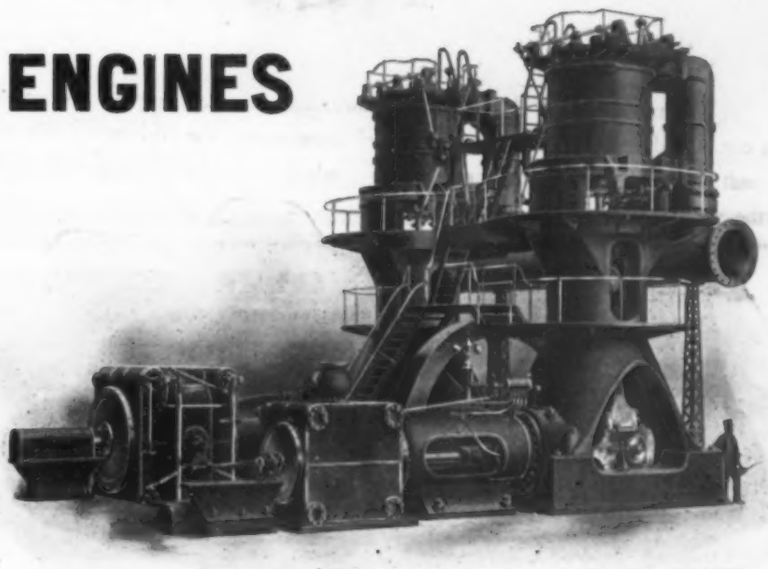

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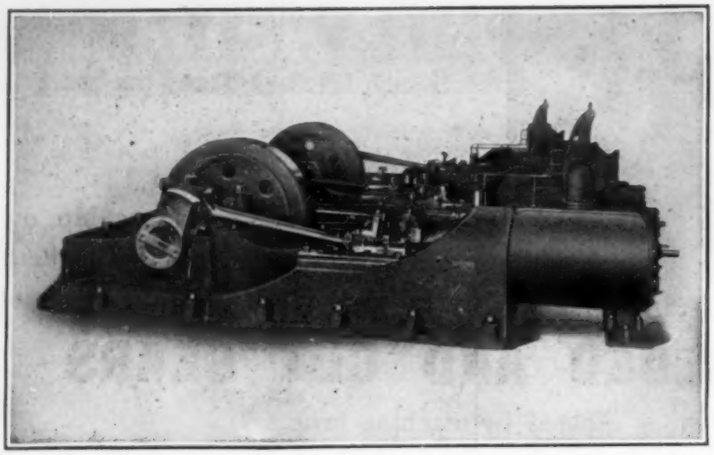

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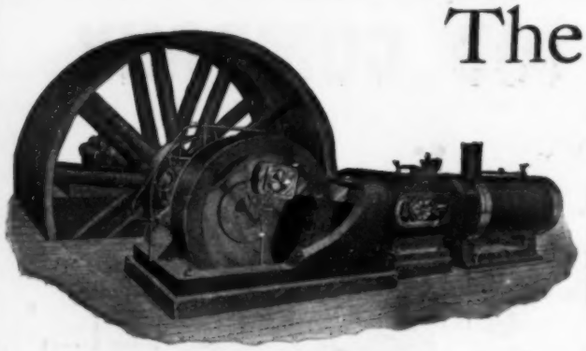

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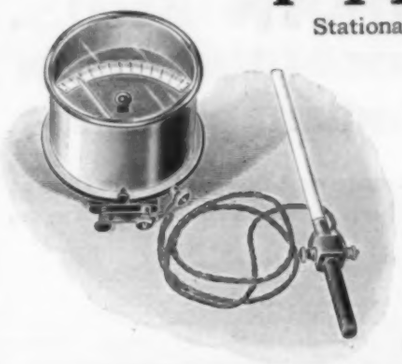

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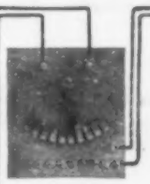
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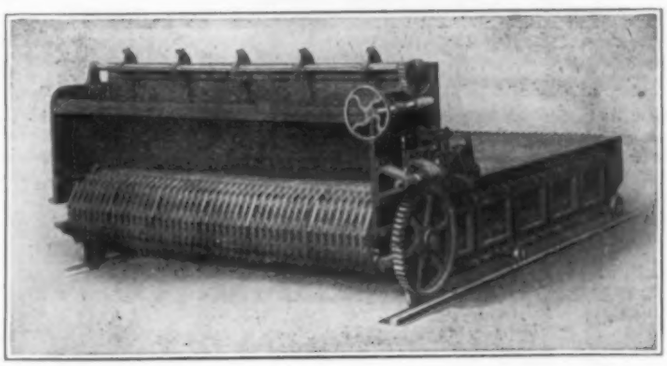

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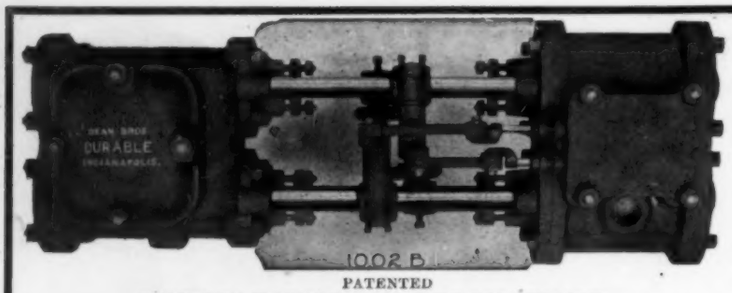

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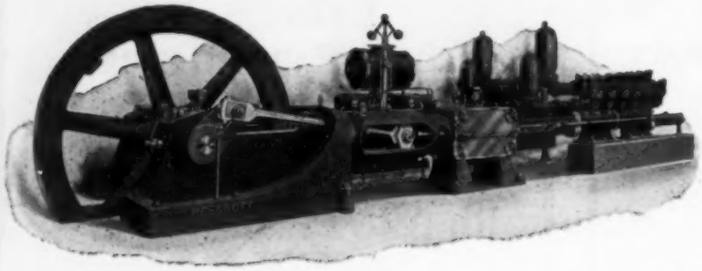

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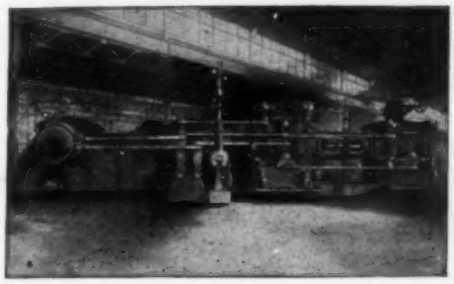

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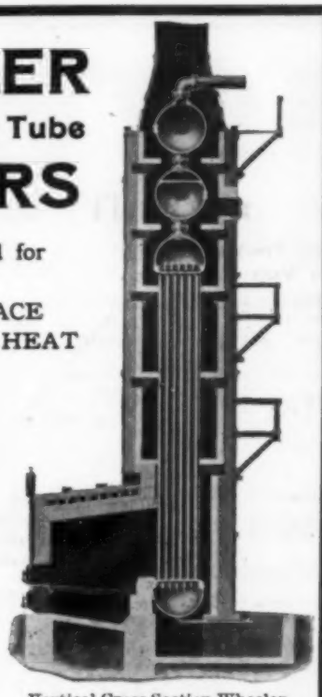

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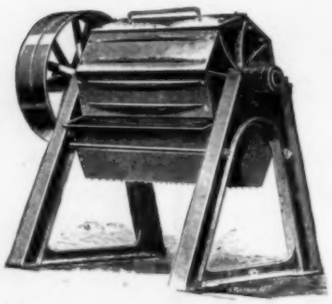

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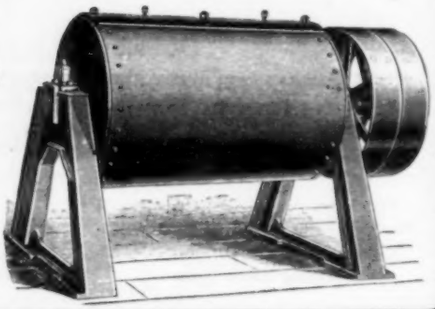

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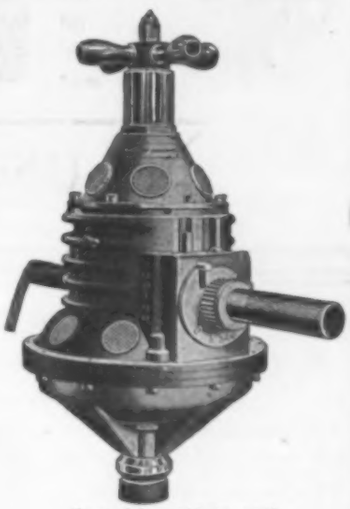

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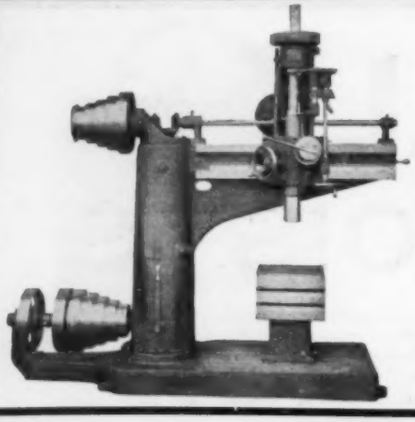

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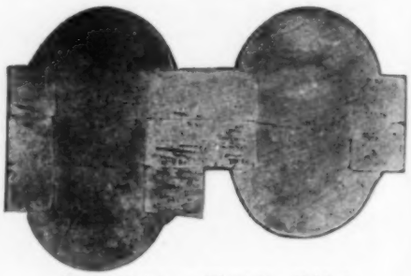

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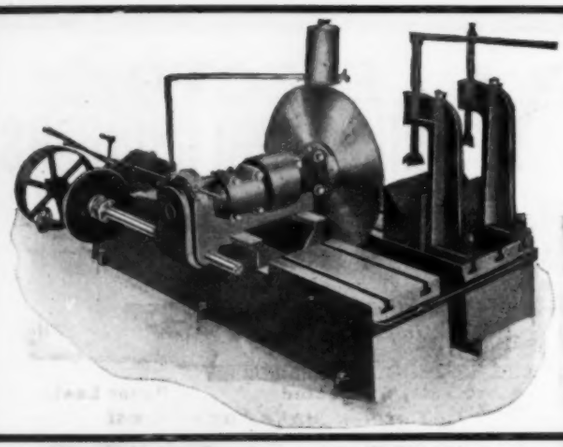

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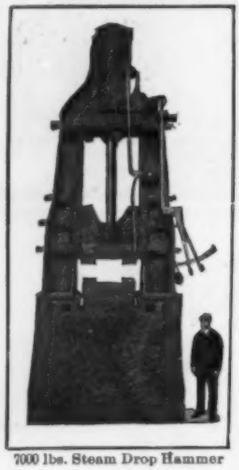

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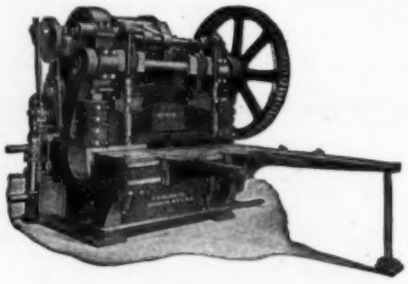

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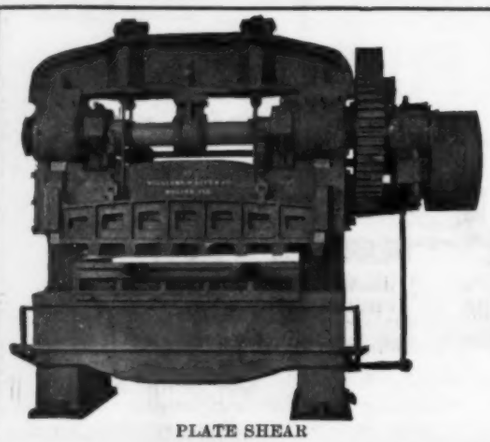

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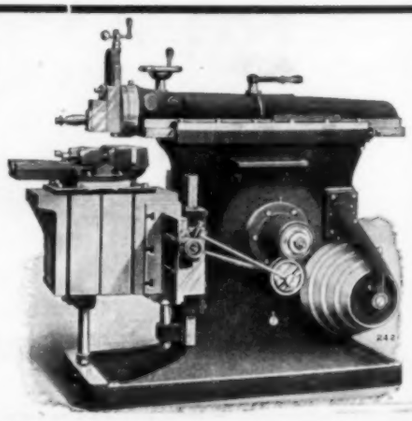

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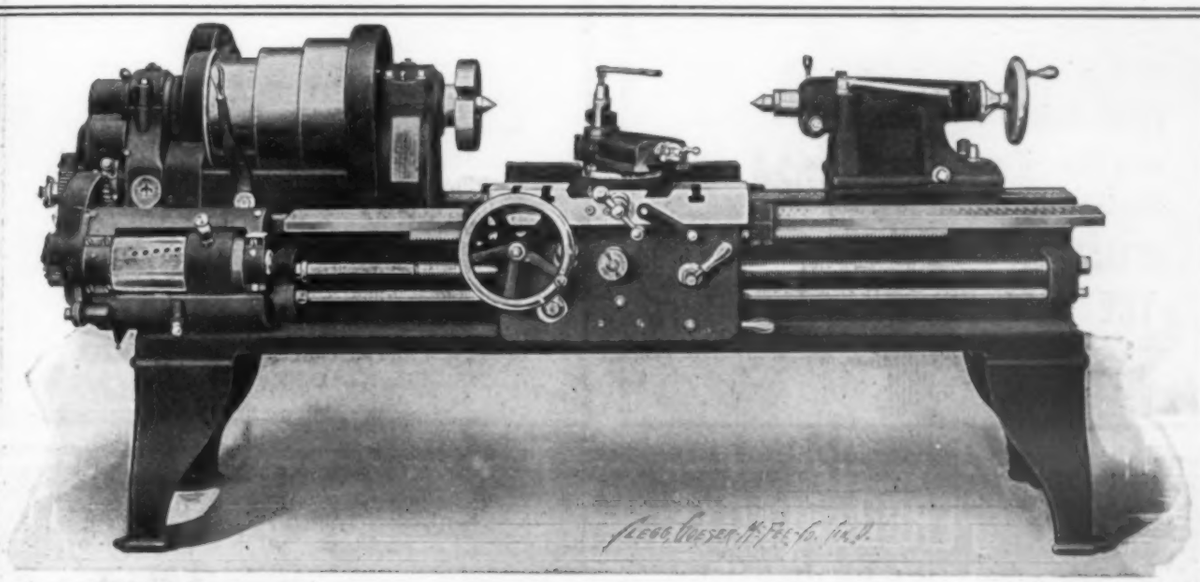

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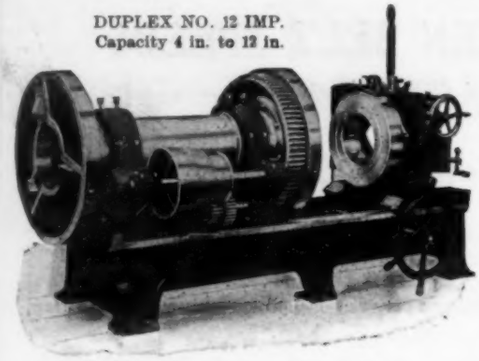

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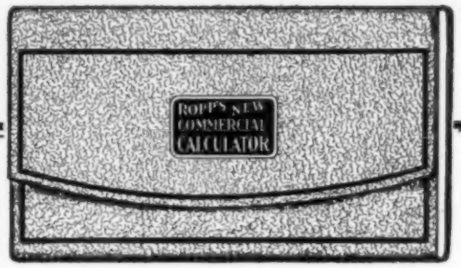

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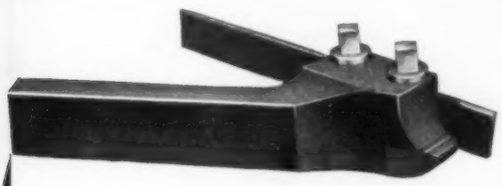

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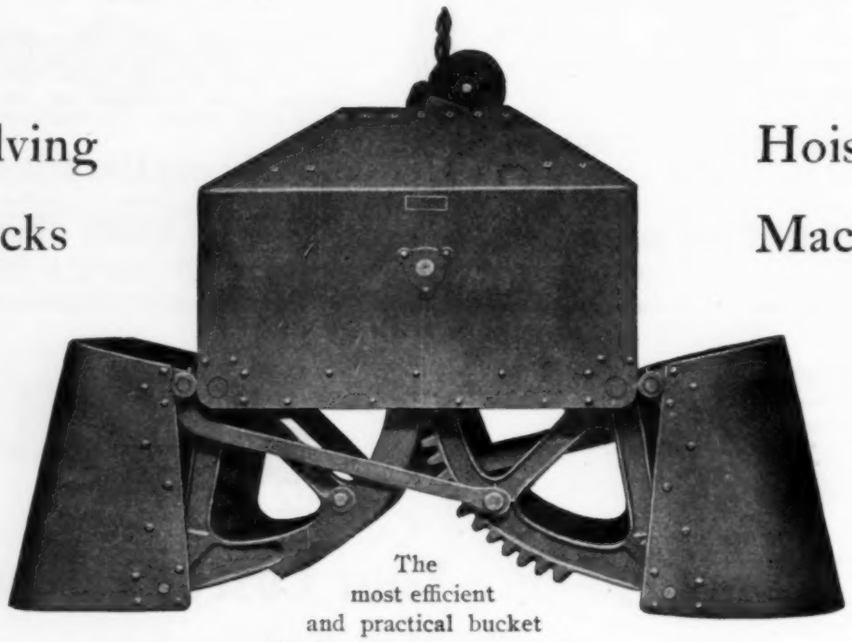

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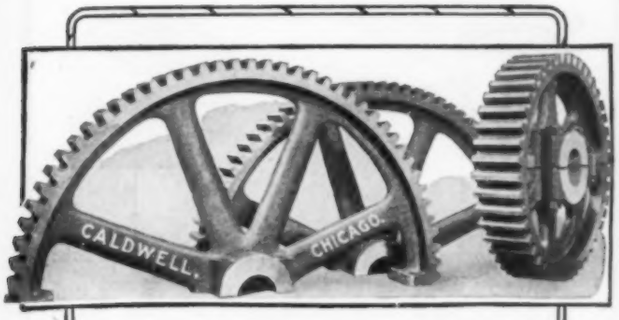

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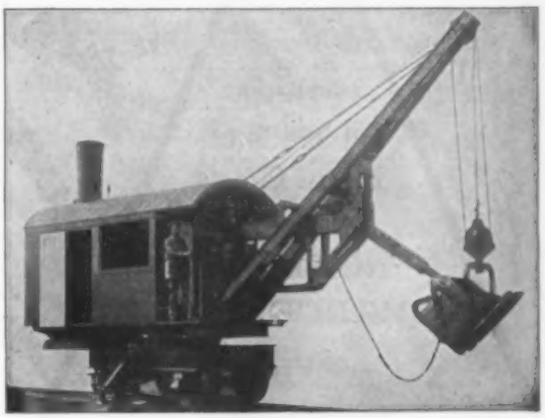

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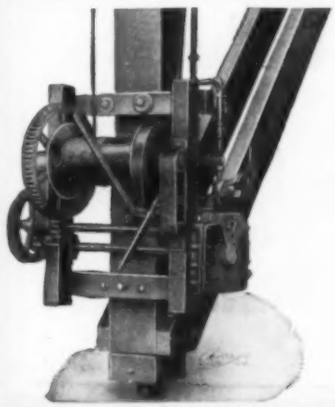

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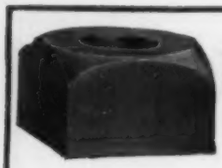

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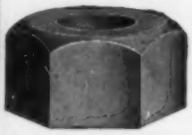

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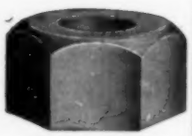

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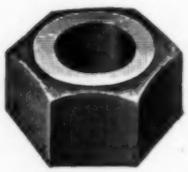
Some Hot Pressed Nuts



Are so rough looking that a good mechanic hates to use them. The "Milton" brand are not that kind. They are made as good as it is possible to make a Hot Pressed Nut. They have the tensile strength of the best of iron and they are manufactured by a process that finishes them in good shape for honest service. Some of our buyers think they are good enough for any kind of work. We would like to have you try them when in need of anything in this line.

The Milton Manufacturing Co.,
MILTON, PENNSYLVANIA.

We also make Cold Punched Nuts, Washers, Refined Bar Iron, etc. 2

Russell, Burdsall & Ward Bolt & Nut Co.

PORT CHESTER, N. Y.

Are making a specialty of the manufacture of

Cold Punched Steel Tapped Nuts

Either Plain, Chamfered and Trimmed,

SEMI-FINISHED, or FINISHED and CASE HARDENED.

Tapped Nuts a Specialty.

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Van Dorn & Dutton Co.
CLEVELAND, OHIO
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GEAR CUTTING our specialty.
Especially equipped for handling break-down jobs.
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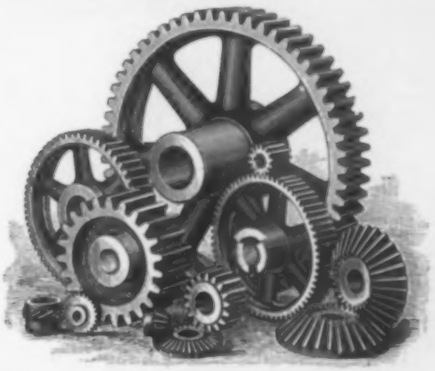

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Our Free Booklet will interest you.

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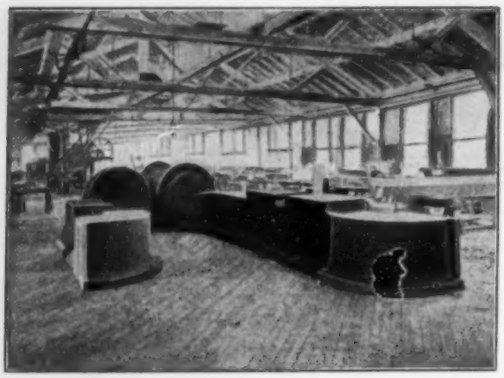

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Time, skill and money are spent upon some friction surfaces in grinding, burnishing or polishing them so as to secure a surface that is comparatively free from microscopic roughness.

Dixon's Flake Graphite accomplishes in any bearing precisely the same results as the costly mechanical methods of smoothing surfaces---better results, in fact, for it will improve even the finest fitting bearings.

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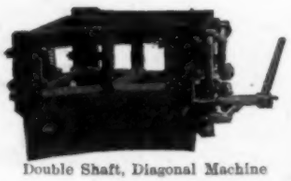

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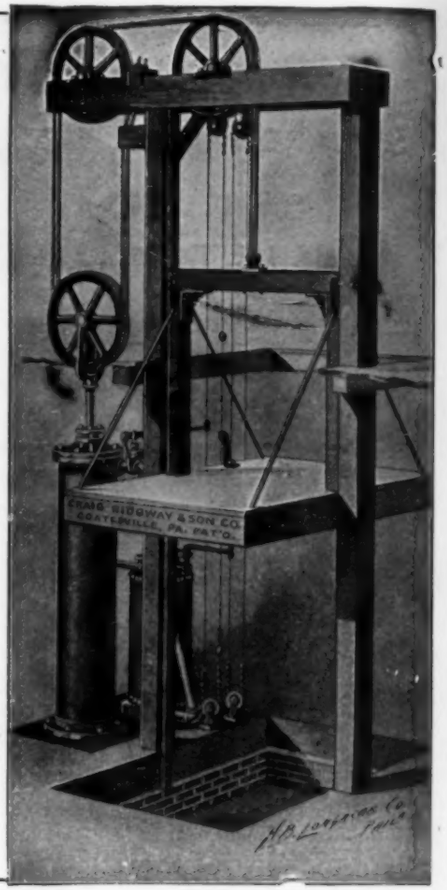

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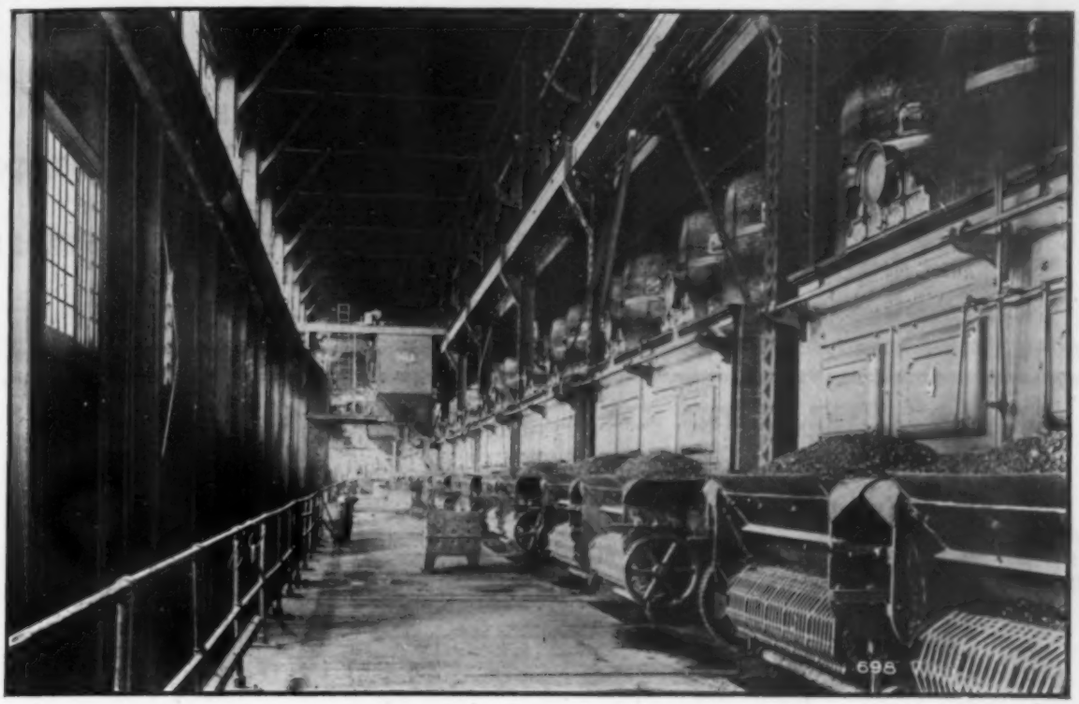

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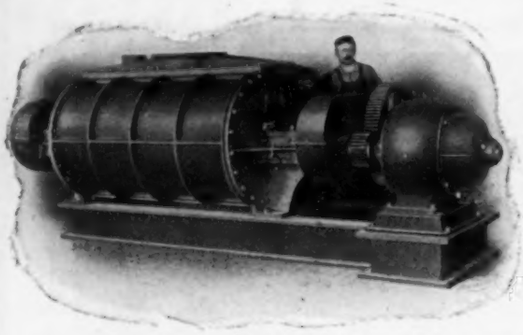

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Well, some people think that they can get along without them; others do not believe in them; but there are still others who have found out that Cochrane Separators are good investments both as regards what they do and what they save.

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"HIGH-SPEED" Chain Hoist

The bearings of the Hoist have GRAPHITE-BRONZE BUSHINGS. They are self-lubricating, they require no oil, and will run indefinitely without cutting.

Fig. 1

The lift wheel, Fig. 1, that is, the sprocket wheel which carries the lift chain, is cast in one piece with the spur wheel that drives it. This double wheel turns freely upon a hollow shaft rigidly supported at both ends in the frame. The spur wheel is encircled by a yoke having internal teeth meshing into the spur wheel teeth and driven with a gyrating movement about it by two eccentrics placed diametrically opposite. The hand wheel shaft passes through the hollow main shaft, carrying at the further end a pinion which drives two spur wheels, one on each of the two eccentric shafts.

Fig. 300

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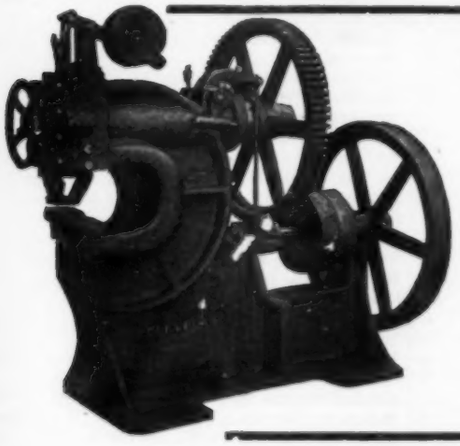
CLEVELAND, OHIO, U. S. A.



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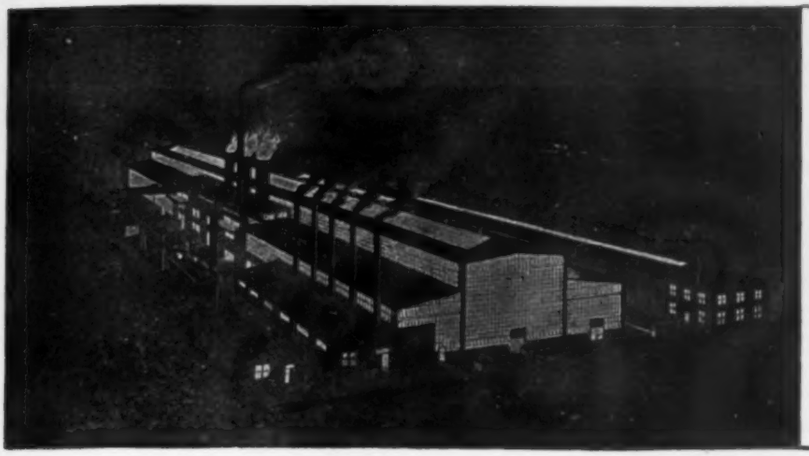

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Our steel will harden like tool steel.

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Scioto Fire Brick Co., Sciotoville, O.
Stowe-Fuller Co., Cleveland, O.
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F. B. Stevens, Detroit, Mich.
Hiram Swank's Sons, Johnstown, Pa.

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Columbus Forge & Iron Co., Columbus, O.
Consolidated Mfg. Co., Toledo, O.
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A. G. Hathaway & Co., Cleveland, O.
Heppenstall Forge & Knife Co., Pittsburg, Pa.
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Wm. Kavanaugh Co., Norwalk, O.
Ohio Forge Co., Cleveland, O.
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Transue & Williams, Alliance, O.
Wyman & Gordon Co., Cleveland, O., and Worcester, Mass.

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Horsburgh & Scott Co., Cleveland, O.
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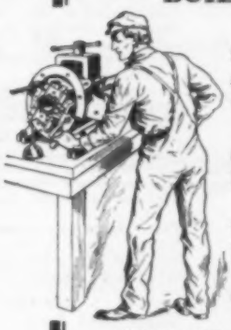

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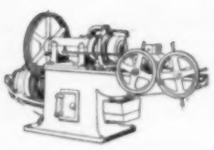

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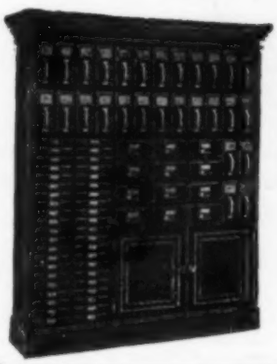

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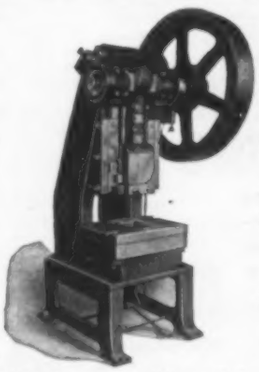

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Farrel Foundry & Machine Co., Ansonia, Conn.
Fischer Foundry & Machine Co., Pittsburg, Pa.
George A. Hogg Iron & Steel Foundry Co., Pittsburg, Pa.
Macbeth Iron Co., Cleveland, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
R. S. Newbold & Son Co., Norristown, Pa.
Rosedale Fdy. & Machine Co., Allegheny, Pa.
Standard Engineering Co., Ellwood City, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engineering & Foundry Co., Pittsburg.
Waterbury Farrel Foundry & Mach. Co., Waterbury, Conn.
Wellman-Seaver-Morgan Co., Cleveland, Ohio.
Wheeling Mold & Foundry Co., Wheeling, W. Va.

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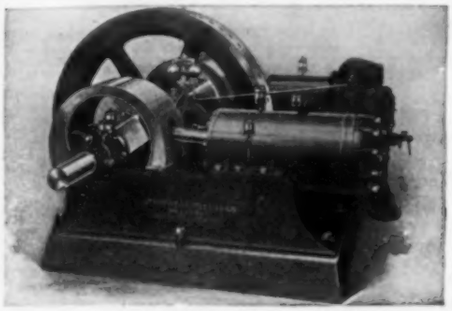

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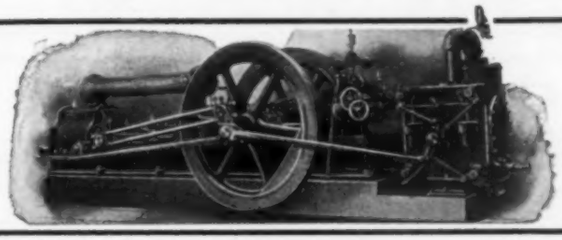

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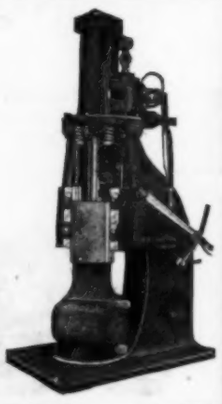

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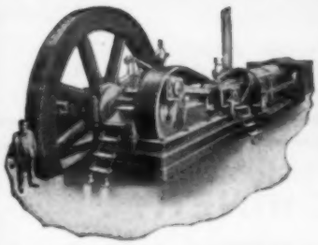

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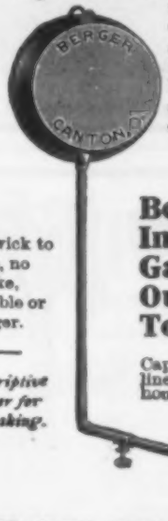

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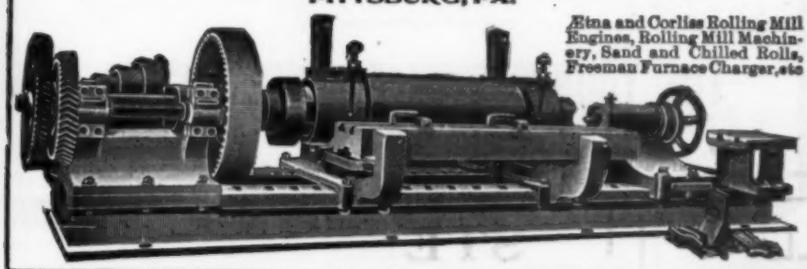

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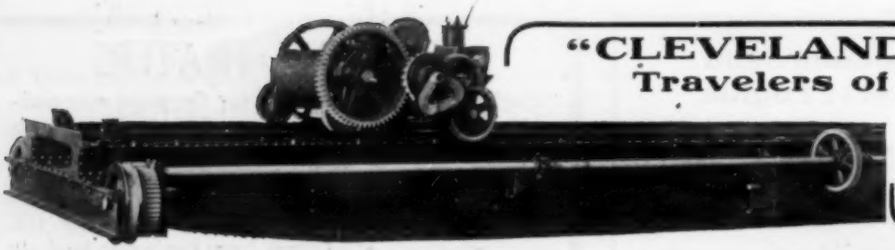

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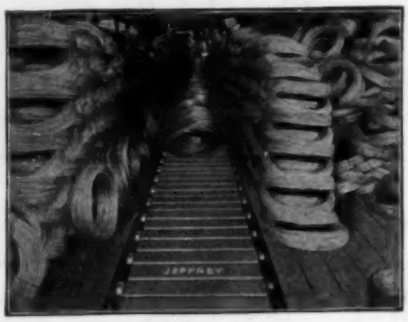

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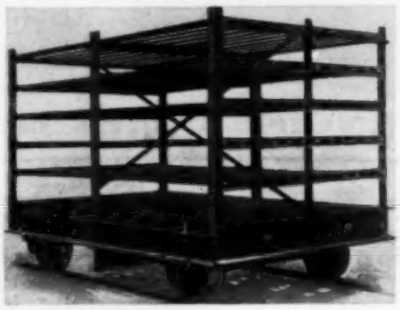

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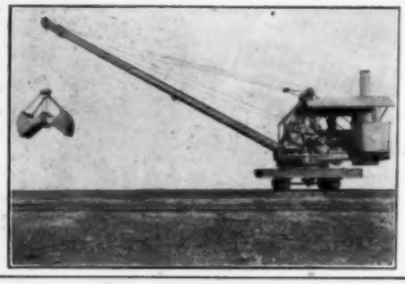

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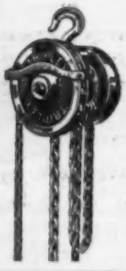

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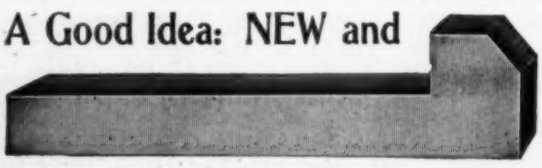

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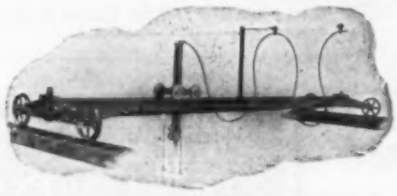

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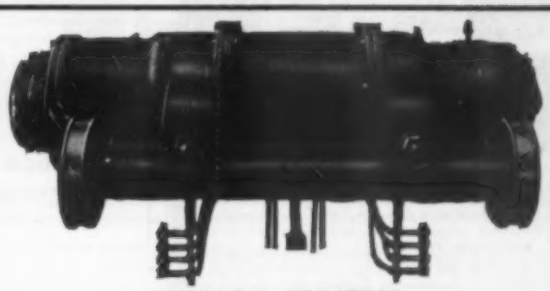

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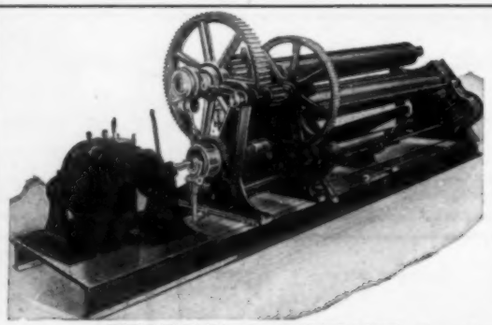

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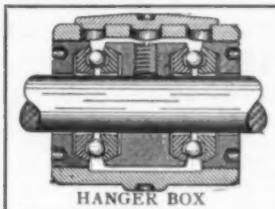

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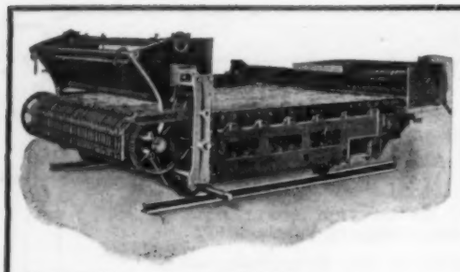

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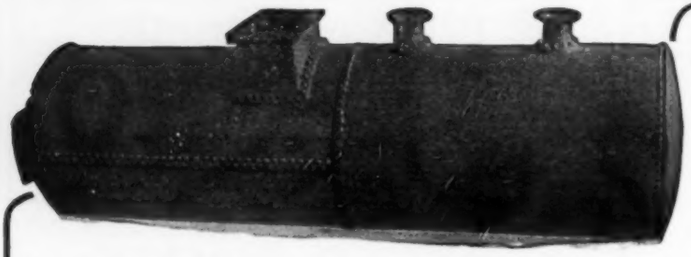

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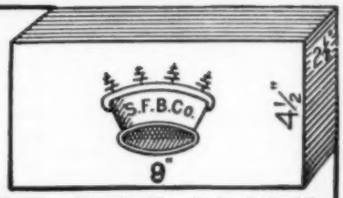

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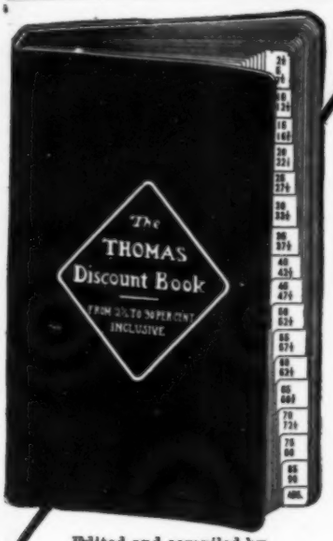

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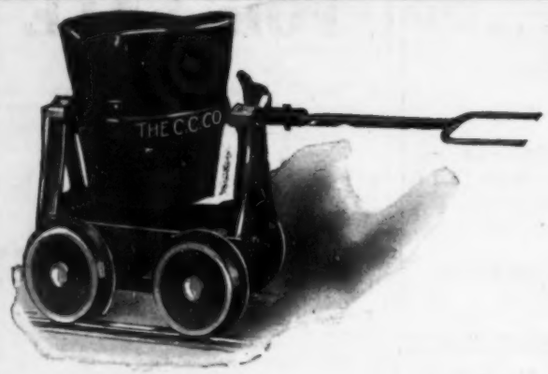

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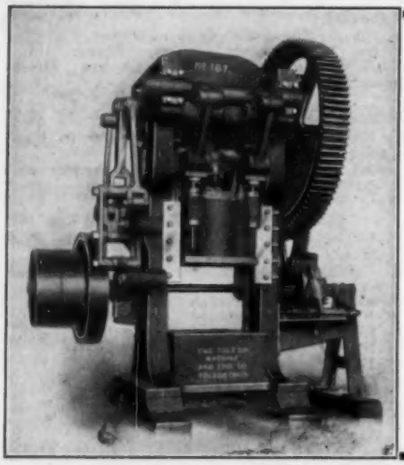

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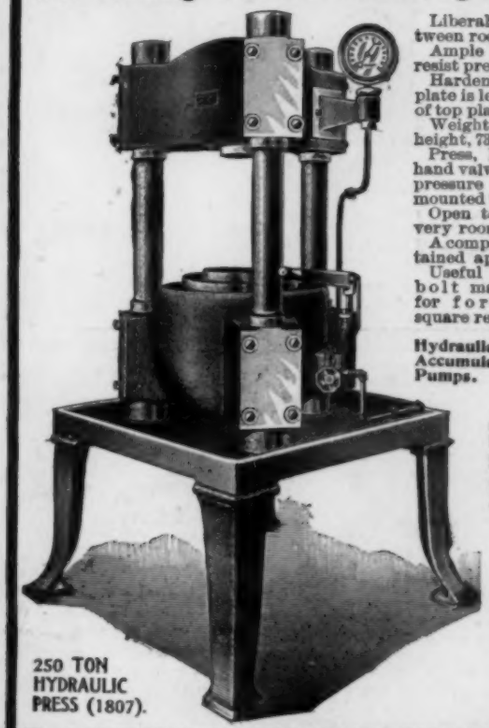

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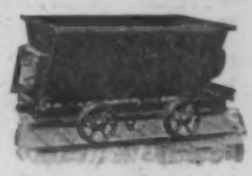

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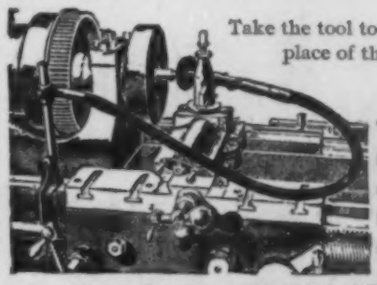

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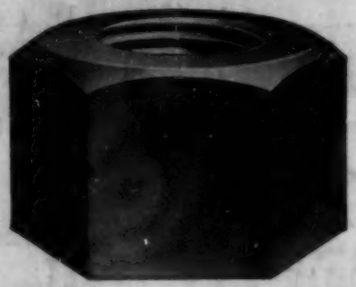

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